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## Contents

EDITORIAL:	
Editorial Notes .....	117
A Comparison That Is Slightly Inaccurate.....	118
"Productive Efficiency" and Wages.....	118
*St. Louis & San Francisco.....	119
New Books .....	121
LETTERS TO THE EDITOR:	
Poetry on the B. & O.; R. M. Van Sant.....	122
A "Reasonable" Valuation.....	122
The First Armored Train; Frederick Hobart.....	122
MISCELLANEOUS:	
*Large Steam Locomotives, Present and Future.....	123
*Railway Affairs in Other Countries.....	124
Arbitration of Engineers' and Firemen's Demands.....	125
Locomotive Headlights in Vermont.....	127
Train Accidents in December.....	128
Are You Making Friends for Your Railroad; Roy V. Wright.....	129
True Theory of Railroad Operating Records; F. Lincoln Hutchins.....	132
*Pacific and Mikado Type Locomotives for the New Orleans & North-eastern .....	134
The New Era for Railroads; Daniel Willard.....	135
The Farming Code.....	136
*Interlocking at North Philadelphia; W. M. Post.....	136
State Commission Reports.....	138
*Sanitary Drinking Fountain.....	139
*Steel Frame Truck.....	140
*Ventilating Fan .....	140

## MAINTENANCE OF WAY SECTION

EDITORIAL:	
Editorial Notes .....	141
The Effect of Heavy Wheel Loads on Track.....	141
Organization for Emergencies.....	142
New Books .....	142
LETTERS TO THE EDITOR:	
*A Crossing of Standard and Narrow Gauge Tracks.....	143
Organization for Track Maintenance; J. L. Coss.....	143
MISCELLANEOUS:	
Abstract of Engineering Articles.....	143
Methods of Handling Snow on Northern Roads.....	144
*An Interesting Pier Protection Problem.....	147
*Promoting Safety in the Maintenance Department.....	148
*Lining the Snoqualmie Tunnel .....	152
Development of P. R. R. Track Inspection System; Joseph T. Richards .....	153
*A Unique Method for the Replacement of Trusses.....	156
Results of Annual Track Inspection.....	157
American Wood Preservers Convention at Chicago.....	158
GENERAL NEWS SECTION.....	
	165

\*Illustrated.

One of the most interesting and significant facts disclosed by the reports of the Interstate Commerce Commission is that recently the commission has been causing more prosecution of patrons of the railways for violating the laws than of railways themselves. The commission's annual report for 1913 shows

### Enforcing the Law Against Railway Patrons

that between December 1, 1912, and the time it compiled its report it had caused the return of 61 criminal indictments for violations of the Act to regulate commerce and of the Elkins Act, and that of these 34 were against shippers for misbilling shipments, securing rebates, etc., and against passengers for violations of the anti-pass provisions. Between the same dates 72 prosecutions for similar offenses were concluded, and of these 46 were against patrons of the railways. We understand that the complete report for 1914 will show an even larger proportion of indictments and prosecutions against patrons of the railways in that year, and that of 25 indictments returned between October 1 and December 1, 1914, no less than 21 were against shippers. These statistics seem to indicate two important points. One is, that the railways are abiding by the law much better than the shipping and traveling public—for in many cases the violations of law by their patrons are of such a nature that the railways cannot prevent them. The other point is, that the commission is showing a commendable disposition to enforce the law impartially as well as vigorously. It has been urged as an objection to the present system of regulation that it makes the commission a prosecutor as well as a judge of the railways. It has been often overlooked that the commission occupies exactly the same dual relation to law-breaking patrons of the railways as to law-breaking railways; and doubtless its knowledge of the offenses of the latter class tends to prejudice it as much against them as its familiarity with the misdeeds of the former tends to prejudice it against them. This, of course, is not to say that the general principle of having the commission act as both prosecutor and judge is not a bad one.

We publish in another column a letter from a railroad officer who criticizes the detail into which the Interstate Commerce

### Criticism of Valuation Methods

Commission is going to make an inventory of the properties of the railways for its valuation, and also criticizes valuation as a basis for rate making. We agree with most of the exceptions which our correspondent takes to valuation as a basis for rate making and also with most of what he says regarding the needlessness of going into minute details in making an inventory in connection with valuation. But criticisms of this kind should not be directed against the Interstate Commerce Commission. They should be directed against the courts and Congress. It is the courts which have established the principle that the fair value of the property is the chief basis for determining the reasonableness of rates. In thus holding, the courts have not indicated all the factors which should enter into a valuation or how much weight should be given to each of them. They have, however, indicated that much weight must be given to the original cost of construction and the probable cost of reproduction, and have in so many cases criticized valuations for not going into enough detail regarding these matters as to have justified the Interstate Commerce Commission in thinking that it must go into a very great deal of detail in order to make a valuation which the courts will uphold. Furthermore, Congress in the legislation requiring that the valuation be made, directed the commission to collect an enormous amount of information of various kinds. It is quite true that Congress did not fully realize what it was doing when it passed the law, but that is no good reason why after Congress has passed the law the commission should not carry it out. In the main, the commission is handling the valuation as well as it probably can in

view of the instructions under which it is acting and the resources which have been placed at its disposal, and those who criticize the use of valuation as a basis for the regulation of rates or the general plan which the commission is following should have recourse to Congress and not to the commission.

#### A COMPARISON THAT IS SLIGHTLY INACCURATE

WHEN one stops to think how marvelously perfect the operation of the Interborough Rapid Transit's system must be to handle the enormous crowds which jam into the subway and elevated trains at rush hours, a certain amount of enthusiasm is permissible. When, however, the Interborough's statistician bursts into half-page newspaper advertisements with a comparison of one passenger killed in 842,620,000 carried, on the Interborough, as against one killed by the steam railroads in 2,610,000 passengers carried, with the implication that the Interborough handles its passenger business something over three hundred times as safely as the steam railroads, statistical enthusiasm has reached the point of intoxication.

The Interborough's figures for its own record are for the five years, six months and twelve days ended January 12, 1915. The figures for the steam roads are for the five years ended June 30, 1913. The Interborough's statistician gives the number of fatal accidents to passengers on steam roads, excluding trespassers, for the five years, as 1,862. The Interstate Commerce Commission's records show 1,534 of all classes of passenger train passengers killed by all sorts of accidents, including falling off cars and engines, getting on or off cars or engines, being struck or run over by cars and engines, etc., and including probably a few victims of accidents on station platforms and stairs. The Interborough's figures for steam roads probably include passengers on freight trains. The mere fact, however, that the Interborough does not operate freight trains is a bagatelle compared with the other factors which make the comparison wholly misleading. Since it is impossible to get from any disinterested source the Interborough's figures down to the minute of the accident week before last, it is fair to compare the records for the latest year for which there is officially published information.

The annual report for 1912 of the New York Public Service Commission, First district, shows 37 passengers (which term, of course, excludes trespassers and employees) killed on the Interborough Rapid Transit's lines. During that year 607,244,697 passengers were carried by the Interborough. There was, therefore, approximately one passenger killed in 16,410,000 carried. Of course it is not number of passengers, but passenger miles which should be compared to measure varying degrees of safety. There are no figures available for the average length of haul on the elevated, but in 1912 the average length of haul on the subway was 5.75 miles. The elevated probably has a shorter average haul than the subway.

In 1912 the average passenger journey on steam railroads was 33.18. To be quite liberal to the Interborough, assume that the steam railroad journey was five times as long as the Interborough journey. The steam railroads in 1912 carried 1,004,081,346 passengers, with a total of 270 passenger-train passengers killed. This figure again excludes trespassers and employees, but includes passengers run over in crossing tracks, falling under trains, etc. This makes one passenger killed in about 3,720,000. Since the average journey was five times that of the Interborough, the two figures that should be compared are one passenger in 16,410,000 for the Interborough and one passenger in 18,600,000 for the steam railroads. Of course the Interborough's figures include suicides, which are accidents which cannot be avoided by any imaginable vigilance on the part of the company; but some of the people killed by steam railroads undoubtedly also were suicides. The above figures are not meant to show that the Interborough is not a safely operated road, but simply to

show the low esteem in which the Interborough's statistician must hold the public intelligence in making a comparison between steam roads and the Interborough such as that appearing in the advertisements which it has issued this week.

It is obvious enough what the Interborough was trying to get at insofar as the figures for *their own number killed* is concerned; that is, passengers actually killed in train accidents. Both the figures showing 37 passengers killed on the Interborough and 270 killed on the steam roads include persons not killed in train accidents. If a correct comparison were made including only persons killed in train accidents, undoubtedly the Interborough would show up very much better than the steam roads, but conditions of operation on the Interborough are widely different from on the steam roads.

#### "PRODUCTIVE EFFICIENCY" AND WAGES

THE foundation for the arguments for an increase in the wages of the engineers and firemen of western roads which have been advanced before the arbitration board sitting at Chicago by the spokesman of the employees, is the claim that there has been an increase in the "productive efficiency" of the railways; that as a result the "productive efficiency" of the engineers and firemen has increased; that there have been additions to the engineers' and firemen's labors and responsibilities; and that they should benefit accordingly.

If this "productive efficiency" theory is a valid argument for higher wages for engineers and firemen, it is an equally valid argument for advances in the wages of all classes of railway employees. It is easily demonstrable that there has been an increase in the traffic units moved, not only for each engineer and fireman, but also for each conductor, brakeman, station agent, section foreman and track laborer—not to mention general managers, vice-presidents and presidents. Therefore, on this theory, the wages of all who work for any railway on which there has been an increase in the traffic units handled per employee should be increased.

But what if there are certain classes of employees who have contributed to the increase in "productive efficiency" unwillingly and under protest? What if some of them have made demands the granting of which would have prevented an increase in "productive efficiency"? What if, when these demands have been refused by the managements, they have gone to regulating commissions, legislatures and Congress, to get orders or legislation the purpose and effect of which would be to prevent the increase in "productive efficiency"? Would it be entirely logical for such employees, after these efforts of theirs had been defeated, to come in and base demands for advances in wages on the very increase in productive efficiency which had been made in spite of all their protests to the managements and in spite of all the lobbies they had maintained at the state capitals and at Washington?

We are not discussing an imaginary case. This is exactly what has happened. The firemen have demanded that the managements put two firemen on large engines. They are making this demand in the arbitration proceeding now pending. In some states they have sought legislation on the subject. But is it not obvious that the "productive efficiency" of each fireman—in other words, the ton-miles moved per fireman—will be less when a train is pulled by an engine having two firemen than when it is pulled by an engine having only one? If the firemen should get an advance in wages in this case based on their increased productive efficiency, would their leaders go off at once to the state legislatures to get legislation requiring two firemen on an engine—in other words, legislation to abolish the very productive efficiency on which had been based their advance in pay?

And, then, there is the demand for more men in a train crew. If a freight train hauling 1,000 tons is manned by five men, the productive efficiency of each man is greater than if it were manned by six men. Therefore, to seek legislation to require the railways to put on a sixth man is to seek legislation to re-



duce the productive efficiency of each man in the crew. Yet this is just what the Brotherhood of Railroad Trainmen has done in its agitation for "full crew" legislation. The Brotherhood of Railroad Trainmen recently has been meeting bad success in its campaign for train crew legislation. It has therefore taken a new tack. It is now agitating for legislation to restrict the number of cars in a freight train to 50. Suppose that a railway had been hauling 75 cars in a train, and that such a law were passed. This would reduce by 33 1/3 per cent. the productive efficiency of every employee in the train crew—engineer, fireman, conductor and brakemen. The engineers and firemen claim that where there is an increase in productive efficiency they are entitled to benefit by it. It is a poor rule that won't work both ways. If legislation were passed reducing the productive efficiency of each man 33 1/3 per cent, would the engineers and firemen agree to a reduction of 33 1/3 per cent. in their wages?

That would be logical. But the engineers and firemen are not logical. This is shown by the nice distinction which they draw between "productive efficiency" in freight service and "productive inefficiency" in passenger service. The statements they have introduced all relate to freight service. This is because there has not been the same increase, or perhaps any increase, of "productive efficiency" in passenger service. Nevertheless, they are asking for advances in the wages of engineers and firemen in passenger as well as freight service. Manifestly, on their own theory, logically applied, there should be no advance in wages in passenger service. But, their spokesmen say, the failure to increase productive efficiency in passenger service has been the fault of the management, and employees should not be made to suffer for it. But if the failure to increase productive efficiency in the passenger service should be debited to the management, may it not be that the success attained in increasing productive efficiency in the freight service should be credited to the managements? And if, on the other hand, both the managements and the employees deserve credit and compensation for the increase in productive efficiency in the freight service, why should not the employees participate with the owners of the railways in the unprofitableness of the passenger service?

Again, as the employees have shown, some western roads are prosperous. But it can also be quite conclusively demonstrated that some other western roads are not prosperous; indeed, a number are bankrupt. The theory of "productive efficiency" would seem to require that if the employees should share in the prosperity of the more successful roads they should go into "hock" with those which are bankrupt. But this reasoning does not appeal to the employees. On their theory, they should share in the profits of the prosperous roads, but only the stockholders and bondholders should go "broke" with the railways which fail.

The principle of the relation between productive efficiency and wages being advanced in this case is practically a principle of profit-sharing; and it does not appeal to a rational mind as wholly logical for those who advance and advocate such a principle to contend that they should be allowed to share to a very large extent in the results of the progress of an industry, but should not be expected to share at all in its reverses.

However, it is gratifying to find that the engineers and firemen have at last discovered that there is a relationship between productive efficiency and wages. Labor of all kinds has been remarkably slow to learn that in the long run there can be no increase in real wages for labor as a whole which does not result from increases in productive efficiency; and that there can be no increase in real wages for any class of labor which does not result either from an increase in the productive efficiency of that class or from the imposition of a burden on all other classes of the public for the benefit of that class. When one class of labor gets an advance in wages which is not counterbalanced by an increase in productive efficiency in the industry in which that class is employed, it must be offset by an increase in rates or prices which must be paid by those who buy the services or commodities produced in that industry. The trouble with the railway industry today is that there already have been large increases in wages which have not been offset by increases in the

productive efficiency of labor. If the union labor leaders of this country will actually study the relationship between productive efficiency and real wages, profits and prices, instead of merely jockeying with it, as the leaders of the engineers and firemen are doing, they will learn some things which it will be greatly to the interest of their followers and society for them to learn. Perhaps, then, they will quit encouraging their followers to "make" work, to secure train crew legislation, and to adopt other methods intended to prevent increases in productive efficiency. When labor finds out that it cannot eat the cake of productive efficiency, and at the same time prevent it from being baked, labor and everybody else will be much better off.

#### ST. LOUIS & SAN FRANCISCO

THE St. Louis & San Francisco has been in the hands of receivers since May 27, 1913. At the time the receivers took charge the physical property was suffering from the results of economies in maintenance so rigid as to make some of the lines of the system barely safe for operation. While it was no part of the receivers' duties to add anything to the property except additions and betterments needed for preservation of earning power, it was imperatively necessary to bring the physical condition of the plant up to a point which would permit of reasonably economical and safe operation. This the receivers have succeeded in doing very largely from earnings. There have been \$3,000,000 receivers' certificates issued and sold, and at the end of June, 1914, there was \$4,570,000 interest and rents in default, and cash on hand amounted to \$1,535,000 as against \$4,430,000 on June 30, 1913. But, on the other hand, loans and bills payable had been reduced from \$5,784,000 on June 30, 1913, to \$1,385,000 on June 30, 1914, and outstanding equipment trust obligations had been reduced from \$13,469,000 on June 30, 1912, to \$8,406,000 on June 30, 1914. In the short period from May 27 to June 30, 1913, the receivers could, of course, only make a start in their program of rehabilitation, so that the fiscal year ended June 30, 1914, shows the results obtained during the early part of the period of the work of rehabilitation, and it will not be until the results of operation in the 1915 fiscal year are available that any comprehensive record will have been made of the effect of the receivers' policy on expenses and earnings.

Notwithstanding this fact, however, the comparison between the 1914 and 1913 fiscal years is quite striking in the change shown in expenditures on maintenance and economies in transportation expenses.

Total operating revenues in 1914 amounted to \$44,924,000, a decrease of \$1,127,000, or 2.4 per cent, from the previous year, the revenue ton-mileage in 1914 being 3,028,000,000 as compared with 3,127,000,000 in 1913, a decrease of a little over 3 per cent, and the passenger miles being 535,000,000 in 1914 as compared with 490,000,000 in 1913, an increase of over 9 per cent. Total operating expenses amounted to \$33,271,000, an increase of \$2,560,000, or 8.3 per cent; but, whereas maintenance of way expenses increased 35 per cent and maintenance of equipment 23 per cent, transportation expenses decreased 4.5 per cent. The following table shows the percentage of each class of expenses to total operating revenues in 1914 and 1913:

	1914.	1913.
Maintenance of way and structures.....	17.28	12.50
Maintenance of equipment .....	16.68	13.23
Traffic expenses .....	2.07	2.18
Transportation expenses .....	35.08	35.84
General expenses .....	2.95	2.94
Total .....	74.06	66.69

In 1914 \$1,476 per mile was spent for maintenance of way, comparing with \$1,095 in 1913 and \$977 in 1912. In 1914 3,269,000 ties were used in renewals as against 1,600,000 in the previous year; there were 13,082 tons of 90-lb. rail put in track as against 16,146 tons in the previous year, and 186 miles of track was ballasted as against 296 miles in the previous year. Total figures for money spent on maintenance of way fail entirely, of course, to give any indication of the effectiveness of each

dollar spent, and even figures showing the quantity of material used in renewals give an indication of only the probable betterment of track conditions.

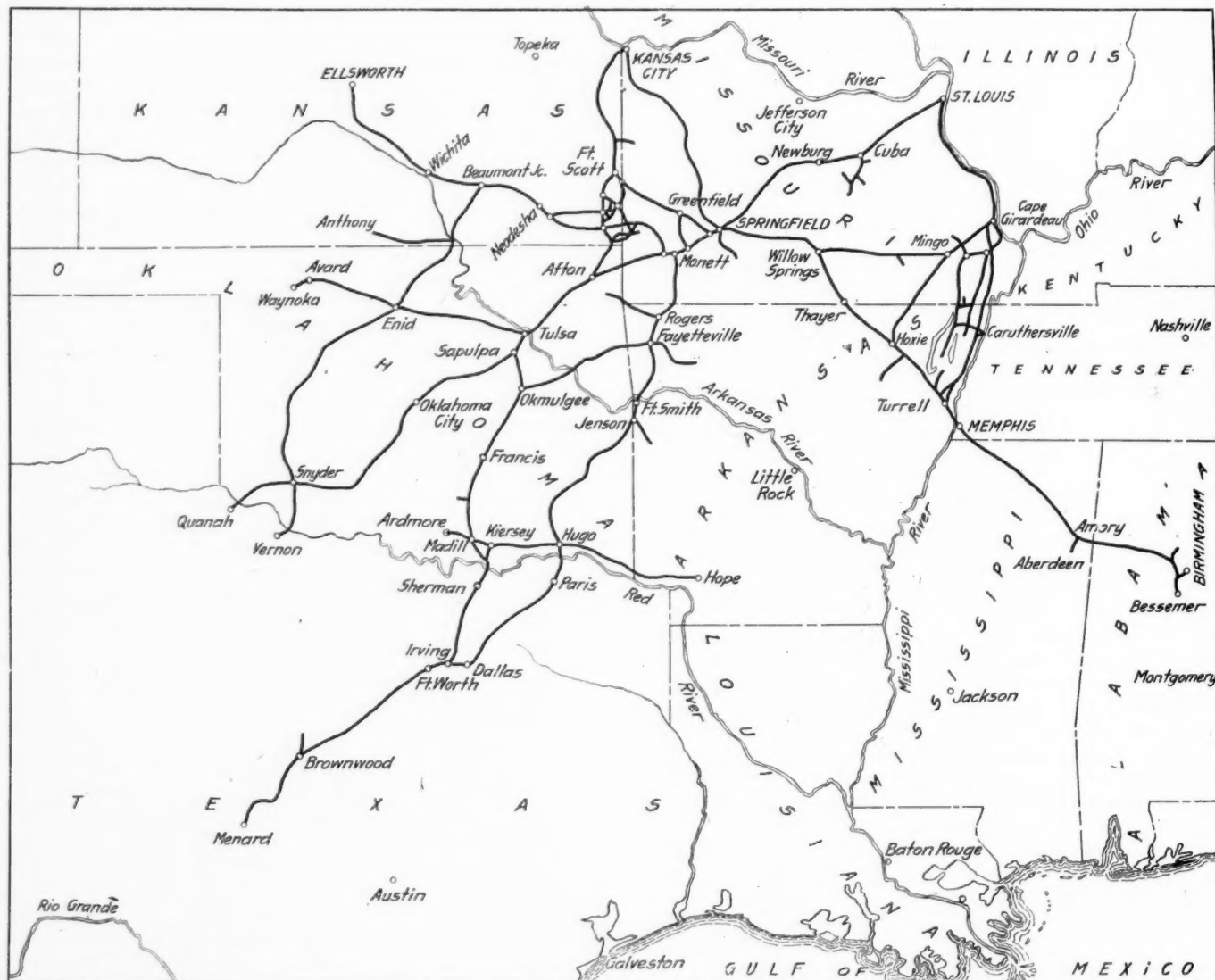
In 1914 \$2,518,000 was spent for roadway and track labor, an increase of 29.8 per cent over the previous year. Steps have been taken which will undoubtedly greatly increase the efficiency of track labor for the fiscal year 1915. Early in 1914 the policy was inaugurated of having the engineering officers and the roadmasters meet in conference to discuss the details of carrying on the work. At the spring meeting, when considerable expenditures were to be made for improving the track and roadway, the greater part of the meeting was given over as to a discussion of how the expenditure might be utilized to

The average expenditure per unit of equipment in 1914 and 1913 is shown in the following table:

	1914.	1913.
Repairs per locomotive .....	\$2,578	\$2,460
Repairs per passenger car.....	774	728
Repairs per freight car.....	107	64

The increased expenditure on repairs of freight cars is striking. The total for repairs, renewals and depreciation of freight cars spent in 1914 was \$3,655,000, an increase over the amount paid in the previous year of \$1,365,000, or 59.6 per cent.

Total transportation expenses amounted to \$15,761,000 in 1914, which is \$744,000, or 4.5 per cent, less than in 1913, and was, of course, affected by the 5 per cent smaller ton-mileage and 9 per cent greater passenger mileage. With the decrease of 5



Map of the St. Louis & San Francisco, Including the North Texas Lines, Which Lie South of Paris, Tex., and Sherman, and Are Under a Separate Receivership

the best advantage. At a meeting held this fall the problem was more of how the individual efficiency of the men might be increased to secure the greatest returns for the money expended for labor. One very radical step has been taken which promises to greatly increase the efficiency of the section forces. A minimum force, consisting of four men and the section foreman, has been established and will be maintained throughout the entire year. This will make it possible to keep the roadway up to a high standard throughout the year as compared with the previous practice, where the forces were cut during certain seasons of the year and special gangs were required to do extra work at other times.

per cent in ton-mileage the mileage of freight locomotives was decreased by 861,000, the total in 1914 being 10,176,000 and the percentage of decrease being 7.8. With the increase in passenger mileage of 9 per cent, passenger locomotive mileage was reduced by 353,000, totaling 9,762,000 in 1914, the percentage of decrease being 3.5. Receivers are generally a little less at the mercy of state commissions in respect to unprofitable passenger trains than are railroad officers representing the owners.

The average total trainload, including company freight, was 351 tons in 1914, an increase of 27 tons over 1913. The ways in which this increase in trainload was obtained were considered at length in an article in the *Railway Age Gazette* of



March 13, 1914, page 501. The improvement is largely due to an educational campaign which was started in September, 1913. It is expected that the developments in this campaign will insure an even greater increase in the 1915 figures as compared with 1914 than was true of those of 1914 as compared with the previous year.

The two items in transportation expenses showing the largest reduction in 1914 as compared with 1913 are fuel for road locomotives, the cost of which in 1914 was \$2,768,000, or \$361,000—11.5 per cent—less than in 1913, and injuries to persons, which was \$355,000 in 1913, or \$238,000—40 per cent—less than in 1913. Of course the fuel economy was partly the result of a smaller locomotive mileage, but the cost of fuel per mile run in 1914 was 12.69 cents as compared with 13.53 cents in the previous year. A description of the methods used to effect these economies in the use of fuel appeared in the *Railway Age Gazette* of November 7, 1913, page 874.

The reduction in payments for injuries to persons is particularly noteworthy. Of course payments on this account on the Frisco, as well as on other lines operating in the Southwest, have been entirely too high, partly the fault of public opinion, which led juries to award preposterously high amounts in damage suits, and partly to the recklessness of employees and to physical conditions. The Chicago, Rock Island & Pacific, which operates about 50 per cent more mileage than the Frisco, spent \$1,046,000 for injuries to persons in transportation service in 1914. Probably the best convenient unit of comparison for expenditures for injuries to persons is the total, including maintenance of way, maintenance of equipment and transportation per employee. On this basis the St. Louis & San Francisco spent \$22 in 1914, and the Rock Island \$36.

In the reorganization of the St. Louis & San Francisco there will, it would appear, have to be a quite radical scaling down of fixed interest charges. The present policy which is being pursued by the receivers will result in further very considerable economies in transportation costs per unit of business handled, and the present expenditures on maintenance are probably a little higher than will be found necessary after the property is once gotten into good shape; but in 1914, despite the fact that payment was unnecessary on the trust certificates of the Chicago & Eastern Illinois, which payments amounted in 1913 to \$1,121,000, nor did the Frisco have to bear the loss on the New Orleans, Texas & Mexico, which loss in 1913 cost the Frisco \$1,214,000; nevertheless, the Frisco had a deficit, after making interest charges, of \$2,828,000 for the year 1914.

As has been so often demonstrated in American railroad history, the best operating officers in the country can only do a certain amount toward making the business as a business profitable, and the future of the Frisco will depend very largely on the wisdom, conservatism and courage which is shown when the time comes to put forward a reorganization plan by those who will formulate this plan.

The following table shows principal figures for 1914 and 1913:

	1914.	1913.
Average mileage operated.....	5,259	5,255
Freight revenue .....	\$30,202,499	\$31,272,807
Passenger revenue .....	11,563,844	11,651,258
Total operating revenues .....	44,923,569	46,050,290
Maint. of way and structures.....	7,762,324	5,755,477
Maint. of equipment .....	7,492,700	6,091,069
Traffic expenses .....	929,037	1,007,326
Transportation expenses .....	15,760,663	16,505,019
General expenses .....	1,325,876	1,352,202
Total operating expenses .....	33,270,600	30,711,094
Taxes .....	2,149,215	2,057,440
Operating income .....	9,503,754	13,281,756
Gross income .....	10,253,665	14,660,779
Deficit .....	2,828,142	667,348

## NEW BOOKS

*Power and Power Transmission.* By E. W. Kerr, professor of mechanical engineering, Louisiana State University. Third edition, revised. 373 pages, 6 in. by 9 in. Illustrated. Bound in cloth. Published by John Wiley & Sons, Inc., New York. Price \$2.

This book is primarily designed to be used as a text book by students of mechanical engineering and the treatment of the subject is elementary throughout. The book was published in

1901, a second edition appearing in 1907. In the present edition the entire text has been reset and much of it rewritten. It contains 24 more pages of matter and 61 more illustrations than the previous edition. The text is divided into three parts. Part I is devoted to machinery and mechanics. The first chapter contains definitions of the fundamental terms used in mechanics and descriptions of elemental forms of machines. Other chapters are devoted to descriptions of various means of transmitting motion, the section closing with a short chapter on pipe fittings. Part II, on steam power, covers the whole field of steam generation and its use in power plants as completely as could be expected in so limited a space. The treatment is largely descriptive of steam power plant equipment and appliances, with brief analyses of the principles of operation. Rotary engines and steam turbines, as well as the various types of reciprocating engines and valve gears, are described. A chapter of valve diagrams is devoted entirely to the Zeuner diagram, which the author prefers on account of its simplicity and adaptability. Part III deals with pumps, gas engines, water power, compressed air and hot-air engines. The treatment is the same as used in Part II. Several short tables on the properties of saturated steam, the flow of compressed air through pipes, etc., are grouped together at the close of the book, for use in solving the problems given at the close of a number of the chapters.

*Statistics of Common Carriers, Preliminary Abstract, 1914.* 187 pages, 9 1/4 in. by 11 1/4 in. Issued by the Interstate Commerce Commission, Division of Statistics; copies to be had of the Superintendent of Documents, Government Printing Office, Washington, D. C., at 25 cents each.

This is the usual preliminary abstract, made up from reports of the principal operating railway companies but with no aggregates for the country as a whole. The pamphlet contains also a preliminary statement of income account and profit and loss account of the principal express companies, and one of the Pullman Company.

*Railway Development Association Proceedings.* Published by the association, H. O. Hartzell, assistant general industrial agent, Baltimore & Ohio Railroad, Baltimore, Md., secretary. 62 pages. Bound in paper.

This book contains the proceedings of the semi-annual meeting of the Railway Development Association held at the LaSalle hotel, Chicago, on November 10, 11 and 12, 1914. The first 15 pages are devoted to the report of the business meeting, and the remaining pages, designated as Section 2, are devoted to the papers presented at the meeting and the addresses presented at the banquet by W. L. Park, vice-president of the Illinois Central, and Samuel O. Dunn, editor of the *Railway Age Gazette*. Some unusually interesting papers discussing various phases of railway development work along the lines of industrial, agricultural and immigration development are included in the proceedings, most of which have been abstracted in the *Railway Age Gazette*. The papers include: "Personal Work with Farmers," by M. V. Richards, industrial and agricultural commissioner of the Southern Railway, and H. M. Bainer, agricultural demonstrator, Atchison, Topeka & Santa Fe Railway; "Diversified Farming and its Relation at this Time to the Cotton Grower," by J. C. Clair, industrial and immigration commissioner of the Illinois Central, and J. F. Jackson, Central of Georgia Railway; "Ways and Means to Increase a Railroad's Agricultural Tonnage," by H. B. Fullerton, agricultural director, Long Island; "The Railway Terminal and Its Relation to Industrial Development," by F. A. Spink, traffic manager, the Belt Railway of Chicago; "The Effect of the European War on American Industries," by R. W. Cooke, industrial agent, Pennsylvania Lines West; "Getting City People Back to the Country," by F. H. LaBaume, agricultural and industrial agent, Norfolk & Western; "Securing Desirable Immigration," by L. J. Bricker, general immigration agent, Northern Pacific; "Efficient Marketing of Farm Produce," by D. G. Mellor, manager of the food, order and commission department, Wells, Fargo & Company, and William Gourlay, general traffic agent, American Express Company.

## Letters to the Editor

### POETRY ON THE B. & O.

BALTIMORE.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In connection with your editorial of November 20 on "Safety First for School Children," you will be interested in the results which we have obtained by the use of some rhymes by Edward Tinker called "Nevers for Children," which we reprinted from Leslie's Weekly, in our Baltimore & Ohio Magazine.

I called the particular attention of the magazine correspondents, one on each division of the road, to these verses, and suggested that they might be used. In response to numerous calls we had about 2,000 copies distributed at various points; and as a result of this I am informed that they have been read to hundreds of thousands of school children in day schools, Sunday and parochial schools, and children's courts. In some of these courts the sheet has been posted up. I also note that the verses have been reprinted in dozens of papers in smaller towns on our lines.

R. M. VAN SANT.

#### NEVERS FOR CHILDREN

Never cross the tracks by night or by day,  
Without stopping to listen and look each way.

Never walk along the railroad ties—  
You can't always trust your ears and eyes.

Never hop a freight, for nothing quite heals  
The wound received under grinding wheels.

Never, on a hot or sunny day,  
Sit beneath a box car to rest or play.

Never crawl under a car of freight,  
When the crossing's blocked—play safe and wait.

Never board, or alight from, a train that is moving,  
Accidents daily its dangers are proving.

Never play games 'round the tracks at the station—  
There are much safer places to seek recreation.

Never leave on the rail any spikes or bars,  
Because, in this way, you may wreck the cars.

Never a railroad bridge should you cross,  
A train may come and result in your loss.

Never pick up coal 'round the railroad yard,  
A train may catch you off your guard.

#### A "REASONABLE" VALUATION

FORT WORTH, TEX.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Director Prouty of the department of valuation of the Interstate Commerce Commission says that it will probably cost \$50,000,000 to complete the federal valuation, 70 per cent of which must be borne by the railroads directly, in addition to their share of the taxes to pay the other 30 per cent. It is understood that certain items, such as real estate, location, good will and securities, must be estimated, comprising possibly between 20 and 30 per cent of the total valuation. It may be five or more years before the work is completed, and when done it will be nothing more than a stupendous estimate, made at such a heavy expenditure that if Congress had even expected it to cost half as much as it will, the bill never would have been passed. With the present conditions existing—the railroads starving, the tax payers paying income or war taxes, and with the imperative need of economy, it is advisable to abandon the costly methods of surveys which can only be considered approximate estimates and resort to a method of estimates which will give very nearly the same results as surveys. Enough surveys have been made or can be finished on typical roads to form a basis or guide. The present office organizations should be maintained, but all field work should be discontinued. Two of the government district engineers and one man appointed by each railroad

can make as close and honest an estimate based on data which can be furnished by most railroads as final surveys and estimates of value now being made by the government's present methods.

Including actual personal inspection of conditions, a final report could be made by about 20 engineers for the commission. Two engineers could be assigned to the New York Central, and two more to the Pennsylvania Lines for a year's work; the Southern Pacific and Santa Fe Lines could be assigned to another staff, and the lesser lines could be divided on a basis of about 25,000 miles to each board. There are many miles of lines where records are full and complete, requiring little more than auditing to get a close valuation. When such a board will have finished its work it will not vary materially from a detailed careful survey. By this plan the work can be completed in one year.

The assumed reason for making the valuation is to get data for regulation of rates and securities. It will be of no value for rates, because the four track, \$250,000 per mile, road can charge no more or less than the \$25,000 per mile road, between common points for the same service. There are very few roads on which the value of the securities can be measured by a survey of the track. Possibly it might be well to complete surveys of lines that have become notorious for financial conditions, to satisfy the public. The Panama canal will influence trans-continental rates and the value of railroads has no influence whatever. The Interstate and State Commissions have never considered the cost of a road for one minute, when they suspended a rate.

The only value of the results of this \$50,000,000 job will be a figure showing the size of the debt incurred if the government takes over the roads. It is very easy to see what a fright these figures will give the tax payer. The valuation is not going to be worth \$50,000,000. When first proposed it was to cost comparatively little, but are we now sure that \$50,000,000 will be final cost? Therefore, under present conditions, why not apply the rule of reason and measure the valuation by a cheaper method equally effective?

RAILWAY OFFICER.

#### THE FIRST ARMORED TRAIN

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In a short note in the *Railway Age Gazette* of January 8, page 76, it is stated: "One of the first and possibly the first armored train was that used during the Egyptian campaign of 1882." I know of at least one armored train which was in use at least 20 years earlier. This train had two cars; the principal one being built of heavy timbers on a flat car in the Atlantic & North Carolina shops at Newberne, N. C., in 1862, about two months after the city had been captured by the Burnside expedition. The armor consisted of old rails spiked on the outside of the planking composing the sides and front of the car. It was provided on the sides with slits for musketry fire, and at the front end was a port hole covered with a shutter behind which was mounted a gun from one of the field batteries. The second car was similarly constructed, but armed with a naval howitzer. These cars were run ahead of the engine and were used in reconnoitering along the railroad line west of Newberne. On one occasion, at which I was present, the two cars were run up the railroad within a few miles of Kinston, 22 or 23 miles from Newberne. For that distance, the Confederates had not injured any of the track, the only portion destroyed having been a small bridge near Newberne.

I was quite familiar with these cars, having assisted in the construction and design of both. The officer in charge was a captain in the Twenty-third Massachusetts Regiment, whose name I cannot now recall, but who had been in the motive power department of the Boston & Providence. I was, at that time, in the Ninth New Jersey Regiment and was detailed for some months in the railroad service of the Department of North Carolina.

I do not know whether any other cars of this description were built or used during the Civil War; at any rate, I never saw any.

FREDERICK HOBART.

Associate Editor, Engineering and Mining Journal.



# Large Steam Locomotives, Present and Future

## Possibilities in the Use of Three Cylinders; Compounding; Effect of Trailer Trucks on Boiler Capacity

Several of those who discussed the subject of "Steam Locomotives of Today" at the annual meeting of the American Society of Mechanical Engineers, held in New York, December 2, 1914, dealt with the large locomotive. Parts of this discussion follow:

### LARGE STEAM LOCOMOTIVES

J. B. Ennis, chief mechanical engineer, American Locomotive Company.—The large steam locomotive of the future will probably not be the locomotive of the past. Today we can see possibilities toward further refinement in design; further economies that may be obtained so that the locomotive designer is not yet ready to acknowledge that all has been accomplished that can be.

For freight and pushing service on heavy grades past performances show the adaptability of the articulated compound locomotive. This type is still in the course of development and it will, without doubt, be the generally accepted type for these conditions for some time to come. With the exception of one experimental articulated locomotive, locomotives recently built for the Virginian Railway are the largest of the type. A few particulars of their performance may be of interest. Designed originally for pushing service on grades of over two per cent and normally rated at 115,000 lb. tractive effort, working compound, these engines have proved themselves capable of hauling on a grade of .6 per cent, a train load of 7,180 tons, requiring a drawbar pull of approximately 110,000 lb. On lighter grades and at higher speeds indicated horsepowers of over 3,000 have been recorded. Work of this magnitude necessitates locomotives of exceptional weight and power, and yet the possibilities of this type have by no means been exhausted. As conditions arise in the future in which more power will be required, the use of the articulated engine can yet be extended.

For freight service on easy grades where the capacity of the articulated type is not required, we already have exceptionally large locomotives of the six, eight and ten-coupled types. Simple cylinders operating at 200 lb. pressure have reached a diameter of 30 in., and in order to transmit this power a main axle 13 in. in diameter has been used. Main crank pins, connecting rods and other details are of enormous size. With the increase in the diameter of cylinders, the cylinder centers have gradually been increasing, and frame centers decreasing. This has resulted in higher stresses than those caused by piston thrust only. The weight of revolving and reciprocating parts has reached the point now where, in some cases, proper counterbalancing becomes very difficult. It is doubtful whether much more capacity can be obtained in these types if designed along the present lines, and here it would seem that attention could profitably be given to refinement in design and its relation to the careful selection of materials.

The modern passenger locomotive has reached a high state of development, but there is one problem still to be solved that has been recognized for many years, that of the effect on the rail of the vertical unbalanced forces in a two-cylinder engine. At present, our largest and most powerful passenger locomotives have two simple cylinders, 27 in. to 29 in. in diameter, giving maximum piston thrusts of approximately 117,000 lb., with static wheel loads higher than ever before and, with few exceptions, reciprocating parts of much greater weight. The four-cylinder balanced compound was introduced about ten years ago as a possible solution, and for a few years large numbers of these locomotives were built. There is no doubt as to the results obtained, as far as balancing is concerned, but recently very few have been con-

structed. Four-cylinder simple locomotives have also been tried out, but in both of these types the capacity is limited on account of the available space between the frames, making it practically impossible to provide the power now given by the largest simple two-cylinder engines.

Little consideration has been given to the advantages of the three-cylinder arrangement, although a few locomotives of this type are in successful service today. As compared with the four-cylinder engine, either simple or compound, the three-cylinder type offers the possibility of increased power. With one cylinder located between the frames ample room is provided for a properly designed crank axle and main rod which cannot be arranged for in the four-cylinder type beyond a certain limit. As compared with the two-cylinder engine, the advantages are, briefly, a more even turning moment, an ideal counterbalance condition, and the opportunity to furnish maximum power with the minimum destructive effect on the rail. The power obtained in a two-cylinder engine with cylinders 27 in. in diameter and a maximum piston thrust of 117,000 lb. can be obtained in a three-cylinder engine with cylinders 22 in. in diameter and a maximum piston thrust of 78,000 lb. This decrease of 33 per cent in thrust means a corresponding reduction in the individual weights of all of the machinery, particularly the weights of reciprocating parts.

It is true that considerable progress can yet be made in the two-cylinder engine toward reducing the weights of reciprocating parts by the careful selection of materials and proper design. The three-cylinder engine, however, offers advantages possessed by no other arrangement, and it would seem that for high speed passenger service, at least, this type is well worth considering for the future.

### COMPOUNDING

C. J. Mellin, consulting engineer, American Locomotive Company.—When the first Mallet compound to be used in the United States was built for the Baltimore & Ohio, it was generally considered that it was too large an engine and far in advance of its time, but hardly had its success been established before inquiries came in for even greater power, and since that time practically all locomotives of this class (except for narrow gage roads) are larger than the original Baltimore & Ohio engine. At present 115,000 lb. in tractive effort in compound and 138,000 lb. in emergency are being produced in very successful service and plans are worked out, ready when required, for engines of this type giving 140,000 lb. tractive effort in compound and 168,000 lb. in emergency power.

The next step for heavy power, where road conditions permit, is triple articulation, using the tender as the third unit. One locomotive of this type has been built, though without any emergency power, having a tractive effort of 160,000 lb., but as yet it may be considered as experimental. On account of the limitation in the boiler capacity on such engines it may be necessary to make the tender engine independent of the two other units, subject to regulation at will, in order to get the maximum amount of steam for fanning the fire, as the exhaust from the tender engine has little effect by the time it reaches the stack and may therefore be carried direct to the atmosphere. As a further means of increasing the boiler capacity at the slow speeds at which such an engine would naturally operate, mechanical draft could probably be applied to advantage. By this means a tractive effort of over 200,000 lb. could be obtained.

The superheater has proved to be of great advantage in compounding, still further promoting its economy, since

practically all the superheat in the steam can be utilized before its final exhaust, besides eliminating condensation during the latter part of its extended expansion. This combination of compounding and superheating, when proper cylinder proportions have been observed, affords the greatest economy in locomotive operation, especially in freight service. It is also probable that mechanical draft in combination with a feed water heater will be an additional feature in the direction of economy and improvement of the locomotive, because of the possibility of working the boiler to its required capacity regardless of the speed of the engine. It also removes the unavoidable loss of power caused by the back pressure in the cylinders, which loss increases with the size of the engine.

#### THE USE OF TRAILER TRUCKS

H. V. Wille, Baldwin Locomotive Works.—In sketching the development of the locomotive with respect to increase in capacity, sufficient stress is not laid on the development of the trailer truck locomotive with the attendant possibilities of improvement in boiler design. It is now generally recognized that the use of trailer trucks has permitted the use of boilers of great capacities. Were it not for the development in boiler design rendered possible by the use of trailer trucks, there would be a very limited use of superheaters in the modern locomotive because of the restriction in boiler capacity; and yet when the first trailer truck loco-

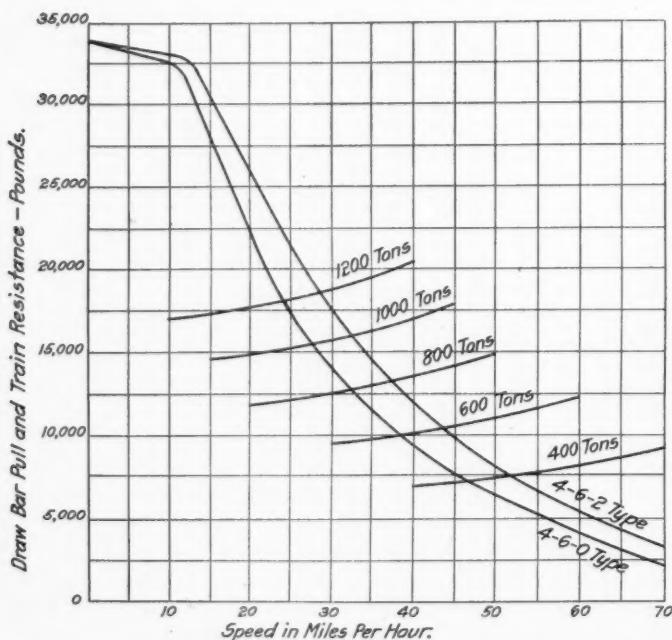


Diagram Illustrating Hauling Capacities of Ten-Wheel and Pacific Type Locomotives at Various Speeds

motive was built, but a short decade ago, it was received with a storm of criticism and the builders stood almost alone as the advocate of this type. The use of the trailer truck is a logical development of the use of wide fireboxes.

The mother of the trailer truck locomotive is probably the engine "Columbia" designed by the Baldwin Locomotive Works and exhibited at the Columbian Exposition in 1892, as a novel type of construction, but this design was in advance of the times. The Atlantic (4-4-2) type was accordingly designed in 1895, and the first one was employed by the Atlantic Coast Line, and derived its name therefrom. While at first the design was received with criticism, the advantages of the type for the development of large fireboxes and large boilers were so manifest that it was rapidly followed by the design of a 2-6-2 or Prairie type engine for the Burlington. The Pacific (4-6-2) type was naturally developed from this type. This engine was designed in 1901 for

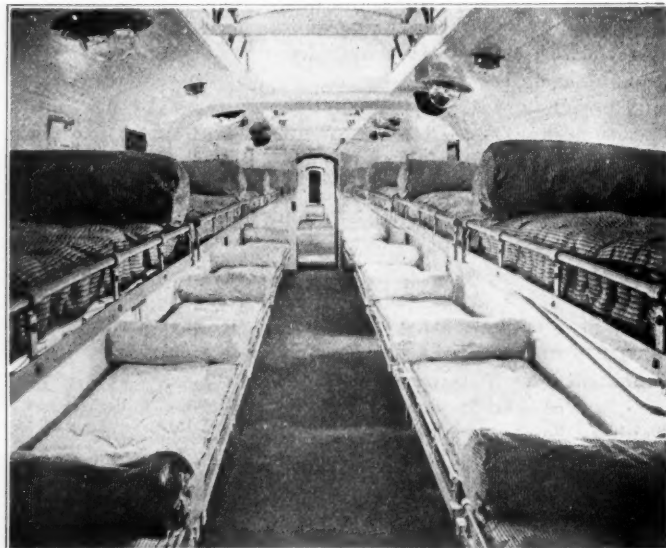
the New Zealand government railways to burn inferior fuel. The development of the trailer truck engine logically followed that of the wide firebox and renders possible the wonderful performance and great capacity of the modern American locomotive.

#### POSSIBILITIES OF THE FUTURE

G. R. Henderson, Baldwin Locomotive Works.—There is one subject which has not been referred to except by the committee, and that is the question of powdered coal. I think in a few years we will have largely extended its use. Powdered coal will also assist in lengthening the firebox and give a greater amount of evaporative surface in that way. These things must be considered as increasing the length of the locomotive. In increasing the length, fortunately, we can put a heavier engine over our present bridges without having to remodel their construction. By lengthening we do not put any more unit load on tracks and bridges, and I think in that way it is possible to build a locomotive of 250,000 to 300,000 lb. tractive effort.

#### RAILWAY AFFAIRS IN OTHER COUNTRIES

The British railways have supplied a number of ambulance trains for carrying wounded men from the sea coast to the various inland hospitals, as has been noted previously in this column. The illustration herewith is an interior view of a train supplied by the Midland Railway. While the railways have almost vied with each other in the provision of these hospital and ambulance trains, the necessity for such ameliorations of warfare has not been lost sight of by other large organizations. The flour millers of the United King-



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An Interior View of the Ambulance Train Used for Transporting Wounded Soldiers on the Midland Railway

dom, through their association, are about to present two hospital trains to the British Red Cross. These trains are for service in France and Belgium, respectively, and are the last word in hospital trains. Their equipment consists of kitchen and stewards' stores cars, an infectious diseases car, a dispensary car, complete with operating room, a staff car which will accommodate three doctors, four nurses and an interpreter, and five ward cars, each of which will take 20 "lying-down" cases. Altogether, each train will accommodate 108 such cases, while the five French coaches which are to form an additional part of the equipment will provide accommodation for a total of 250 "sitting-up" cases. Each train will also have attached to it two baggage cars and two French coaches for the staff, etc.



# Arbitration of Engineers' and Firemen's Demands

## Employees' Case Concluded, Attorney Sheean Makes Opening Statement Outlining Position of Railways

The evidence presented on behalf of the engineers and firemen before the board of arbitration at the hearing in Chicago was concluded on Monday, January 18, and James B. Sheean, attorney for the General Managers' Conference Committee, presented his opening statement outlining the case for the railways. Mr. Sheean said in part:

"At the outset it should be made clear that the conference committee of managers recognize fully that the engineers and firemen perform important and responsible duties. They heartily concur in the view that men selected for these positions should measure up to the responsibilities which their duties impose upon them, and that their scale of wages should be commensurate with and give due recognition to the importance of those duties and responsibilities. The conclusion was reached by the Conference Committee of Managers that either by comparison with employees in other trades, or by comparison with their brethren of other districts, there was no good ground for complaint on the part of the western engineers and firemen. In making that statement I appreciate that the question may be asked as to why it should be that certain rules found in a majority of schedules may not be made of universal territorial application. When standardization is proposed, the party purportedly offering standardization must enable standardization to be made, not upon a basis of retaining the high points given by some other method of computation, entirely inconsistent with the one now in vogue, but in order to standardize must be willing to proceed along the line of wiping out the high points incident to that standardization, as well as the lower points that are incident thereto."

Mr. Sheean then proceeded to enumerate briefly the way in which it is proposed to present the proof of the railways. First, he said, an analysis would be offered of the railroad schedules of the United States so that the board will be able to see at a glance on just what roads and in just what territory and on what percentage of the mileage there are rules which bear relationship to the different requests that have been made. Secondly, he said, "we shall present statements showing what these demands mean in money to the railroads involved. This exhibit shows that during the month for which it is presented, the railroads involved paid their engineers and firemen under existing schedules over \$7,200,000 in wages, and if the proposals had been in effect during that month the railroad would have been required to pay over \$11,000,000, or an increase of about \$3,700,000 in that one month, an increase of approximately 51 per cent. The total payroll of the railroads involved for engineers and firemen for the fiscal year ending June 30, 1913, amounted to over \$75,000,000, so that if the same rate of increase applied to the year's operation the proposals would mean an added burden to the companies involved of nearly \$40,000,000."

"We shall present," he continued, "statements of revenues, expenses and income during the fiscal years 1910, 1913 and 1914, going back to the last adjustment, in order to ascertain what has been the actual operation upon the productive efficiency or revenue theory during this period of time, and these show a constantly declining net revenue and a constant increase in taxes. Although over 8,000 more miles were operated in western territory in 1914 than in 1910, the net income from operations in 1914 was \$15,000,000 less than in 1910, while in 1914 the net operating revenue from operations was nearly \$40,000,000 less than in 1913."

"In 1914 there was declared \$22,000,000 less in dividends than in 1910, and in 1913 \$14,000,000 less than in 1910. In 1914 there was carried to surplus \$24,000,000 less than in 1910,

while the surplus in 1913 was \$12,000,000 less than in 1910. In five months of the current fiscal year there has been a drop of \$29,000,000 in gross revenue.

"We face this situation as to the income of the railways involved, although in three years to June 30, 1913, they spent over \$660,000,000 in improvements and extensions to property, and out of this devoted over \$220,000,000, or practically one-third, toward the purpose of increasing efficiency and safety and expediting train movements.

"Our next exhibit will summarize various legislative enactments and orders of railway commissions which affect railway operations, all necessitating expenditures of large sums of money, and will also show proposed legislation in many western states which if enacted into law will limit economical and efficient operation and render impossible economies which should be legitimately brought about as a result of elimination of grades and curves, the improvement of roadbed and the purchase of larger and better power. The board should be advised in connection with a wage movement seeking to have wages based upon the proposition of 100 per cent efficiency in tractive effort, that at the same time it is also proposed and urged in legislative circles that there shall be a legislative limit placed upon the length and size of the trains hauled, no matter how level the road or how high the power.

"Our next exhibit was prepared to ascertain whether there was justification for the claim that large power and increased tonnage have retarded the movement of traffic and thereby kept the men longer on the road. This exhibit shows that with the elimination of grades and curves, the improvement of roadbed and motive power, the employees have been able with the larger power, and therefore with higher rates of pay, to haul heavier trains at the same speed as in previous years. In October, 1910, about 76 per cent of the mileage was made at a speed greater than 10 miles per hour, and in October, 1913, this had increased to over 77 per cent. In October, 1910, the average length of time on the road in through freight service was 9.41 hours on runs averaging 113.2 miles in length, while in October, 1913, the average length of runs was 112.6 miles, and the average time of making the run in through freight service was 9.31 hours.

"Confirmatory of the exhibit introduced by the men that the instances of employees being on the road longer than 16 hours are of rare and exceptional occurrence (averaging once in every 18 months per employee) an exhibit has been prepared that shows for the year ending December 31, 1913, only .59 per cent of the trains run exceeded the 16-hour limit, and only 0.6 of one per cent of the total trains run were tied up on account of the 16-hour law.

"Another exhibit has been prepared to show the payments under present schedules to engineers and firemen for which no actual service either in miles or hours was rendered by the men, and by this exhibit it is shown that for the fiscal year ended June 30, 1913, these payments on the roads represented aggregated over \$1,000,000. An exhibit will also be introduced which shows the comparison between the eastern, southern and western districts, and from this comparison it is shown that the average freight train load and the average tractive power in both eastern and southern districts are higher than in the western district. This, notwithstanding the fact that rates of pay and compensatory rules are generally higher in western districts than in any other part of the United States.

"We shall also lay before the board the actual payroll figures as to what the men can and do earn in each class of service, so as to give the board as best we can, not simply state-

ments of hypothetical men, but actual earnings of actual men, of all the men for the entire month for which the claims are presented, as well as actual payroll figures for the entire fiscal year of about 5,000 typical men covering each class of service on every seniority district in the territory, and these payroll figures show that in the month in which the demands were presented engineers in regular passenger service earn from an average of \$185 to a maximum of \$341.60 per month, and in freight service from an average of \$170 to a maximum of \$358.70 per month; that firemen in regular passenger service earn from an average of \$115.54 to a maximum of \$209.89 per month, and in freight service from an average of \$110 to a maximum of \$221.05 per month; that other firemen in combination freight and passenger service earn even higher than this.

"Of about 5,000 men whose wages for the entire year to June 30, 1913, will be shown, there is a maximum of \$3,725.20 for passenger engineers; \$3,342.30 for freight engineers; \$1,752.20 for passenger firemen and \$1,890.32 for freight firemen. Against these maxima, the governors of seven states receive \$3,000 or less per year, while those of seven other states receive \$4,000, or only slightly above the engineers' maximum earnings.

"As against the maximum earnings of the firemen, Sunday's newspapers state that at the final session of the association of American Colleges held on Saturday, it was stated 'For \$1,500 a year a college can get a fairly good professor, not a well of wisdom, it is true, but a fairly good man.'

"A careful investigation into the increased cost of living in the West shows that prices have not advanced so fast as have the wages of engineers and firemen under the schedules awarded in 1910.

"Comparison of their wages with those of any other craft, or of any other railway employees, or of engineers and firemen in other parts of the country, show that they are receiving already a higher compensation in both rates of pay and rules.

"Through the elimination of grades and curves and other improvements, the employees have been able with the larger engines, and consequently with higher pay, to haul trains at the same speed as light trains were formerly handled. With heavier power there has been constant improvement in labor-saving devices, such as automatic stokers, automatic doors, coal pushers, sloping tanks, power grate shakers and automatic ash pans operated by compressed air, which relieve the firemen of the danger of going beneath the locomotive.

"It is the intention that the chairman of the Conference Committee of Managers will take up on the witness stand article by article, the requests submitted, and explain from an operating standpoint the practical effect of splitting the working day into numerous arbitrary divisions, and for purposes of compensation segregating each of these items so as to produce arbitrary and punitive payments on every run, to show the inequity of imposing punitive payments in matters which cannot always be controlled in transportation service, and of attempting to impose inflexible rules of universal application, the conditions which must of necessity vary widely in a territory so vast as the one involved, in which there are over 50,000 men working as locomotive engineers and firemen, and 64,000 men on the seniority list, who would be directly or indirectly affected on the over 148,000 miles of railroad main lines.

"Nor should the board be under the impression that assent is given to the suggestion that there is any element of piece work payment in the wage schedules of engineers and firemen. The unit of output of regularly assigned men in road service is the runs or trips covered by their assignments. The units of output the engineers and firemen (unlike the piece worker) do not regulate or control, either as to the number or as to the time of production. These units of production, the run or trip covered by the assignment, are all that bear resemblance to the 'piece' of the piece worker. And

for this unit, conveniently measured for purposes of compensation by its mileage, payment is made at an agreed mileage rate. But more fortunate than the piece worker, whenever this unit is not produced within the limits of a working day, the engineer and firemen have an added guarantee, both of a minimum daily wage of a minimum hourly rate for every hour they are on duty, whether productive or non-productive for his employer."

Cross-examination of W. J. Lauck, statistician for the engineers and firemen, whose testimony before the board of arbitration at Chicago was abstracted in last week's issue, was taken up on January 11, by J. B. Sheean, attorney for the General Managers' Conference Committee and occupied two days. He showed that in most of the statistics presented by Mr. Lauck to show great increases in the efficiency of the railroads from 1890 to 1913, on which Mr. Lauck mainly based his arguments for increased wages, no consideration had been given to the change in mileage of the roads or the amount of investment or changes in accounting methods. The witness said he did not claim his statistics to be strictly accurate, but simply developed the tendency by the best available means.

Mr. Sheean asked a number of questions to bring out the efficiency of firemen, as measured by tons of coal shoveled instead of ton miles of freight, and from one of Mr. Lauck's exhibits showed for 19 roads that have no oil-burning locomotives that in 1909 the tons of coal consumed were 15,140,994, for which the firemen received \$6,651,373, or 2,280 tons of coal per \$1,000 paid to firemen. In 1913, on the same roads, the total coal consumed was 19,136,488 tons, for which the firemen received \$8,774,150, or 2,180 tons per \$1,000 of compensation. Mr. Lauck said he was at a loss to understand these figures because of the increase in fuel consumption per locomotive mile. Mr. Byram and Mr. Sheean said that it was explained entirely by the increase in the firemen's wages in 1909.

"If, during this time," said Mr. Sheean, "in addition to the actual increase in money there had been improvements in the way of automatic stokers, automatic fire doors, sloping tanks, provisions for breaking coal to proper size, automatic shakers, power coal pushers, and other things, that would simply show not only that less coal was consumed, but that it was done with less physical effort, would it not?" "If that could be shown, yes," said Mr. Lauck, "but I do not know anything about that."

Mr. Lauck had said that the men's pay should not be affected by decreased productivity in passenger service, because it was not their fault that there were no more passengers in a train.

Mr. Byram observed that on the larger engines which are producing the greater number of ton miles, a higher rate is paid to the engineers and firemen, and that the fact that the increase in productive efficiency of the men per \$1,000 in the period 1909 to 1913 was less than in the former period might be due to the fact that the instrumentalities which produced the greater efficiency are already compensating the men by paying a higher rate. Mr. Lauck said he was not trying to establish any definite relation between the increased productive efficiency and rates of pay, but that he was simply trying to show the tendency that because of the increased productive efficiency there should be some increase in pay.

A. H. Hawley, general secretary and treasurer of the Brotherhood of Locomotive Firemen and Enginemen, testified regarding accident statistics of the firemen. He said that 47 per cent of the deaths of members of the organization in the 10 years from 1904 to 1913 were the result of railroad accidents while the men were in service. Of the 5,026 deaths in 10 years, 1,292 were engineers, 2,663 were firemen, 105 were hostlers and 866 classed as others, which he said means men who have passed out of the railroad service, or at least out of the engine service. In 10 years the organization has paid on 2,360 claims a total of \$3,270,169 for railroad accidents. Mr. Hawley said that the percentage of increase of railroad accidents was not so great as the increase in the membership, for the reason that a large pro-



portion of the membership is drifting from the railroad service. He also gave figures to show that there had been decreases in accidents of certain classes brought about by the safety appliance laws. This, he said, was to show that the purpose of the men was not frivolous in agitating for the passage of the laws. Cross-examination by Mr. Sheehan showed that the mortality rate in the organization was decreasing; that in 1904, with a membership of 4,434, there were 453 deaths, and that in 1913 with a membership of 91,108, there were 589 deaths; in 1904 there were 236 deaths on account of railroad accidents, and in 1913, 243 deaths on account of railroad accidents.

Dr. Henry J. Harris testified regarding a large number of statistical exhibits showing the hazard of the engineer's occupation, based on figures taken from various insurance companies' records and other actuarial records. He said that the engineer in many respects is a select risk, in that he is a man who has passed a rigid physical examination, and in other respects is above the average, but that many insurance companies will not insure engineers at all, and others do so only at a higher rate than normal. He said that the New York Life Insurance Company charges locomotive engineers a rate based on eight years more than the actual age, and that insurance companies estimate that the risk in the case of engineers is 160 per cent of the normal. He presented various statements to show that engineers have a higher accident and death rate than many other occupations, and classed them as a risk with coal miners and structural iron workers. He said that the average working life of an engineer was from 11 to 12 years. In the railroad service, he said, the brakemen have a higher accident and death rate than engineers.

W. E. Futch, president of the Locomotive Engineers' Mutual Life and Accident Insurance Association, which is connected with the Brotherhood of Locomotive Engineers, testified that the association is now carrying \$145,590,750 of insurance, and last year paid out in claims \$3,063,318. All of the members are now required to carry insurance. He said his records showed that 11 years and 7 days was the average working life of an engineer. Asked regarding the number of men affected by the pension system, he said that on December 31, 1911, the association had 92 members 72 years of age, and 1,781 out of a total membership of 63,647, between the ages of 60 and 70. The average age of all members was 41 years. Out of a total of \$3,424,213 paid in claims in two years, he said only \$2,146,213 was paid on account of natural causes, and \$870,750 was paid on account of death caused by railroad accidents.

G. N. Deguire, a fireman employed on the Chicago & North Western, described the physical examination required of engineers and the elaborate application blanks they are required to fill out, and said that it was not intended to object to the rigid requirements, but to show what a high class of men the railroads require for engineers and firemen. He did object to what he called "black-listing," saying that the information secured by the roads from other roads was improperly used. On cross-examination as to what changes he would make in the application blanks the chief objection seemed to be that they gave the roads an opportunity to find out whether a man had left the service of another road on account of a strike, and he said that a man might be discharged for insubordination simply for losing his temper on account of the action of some minor official, and would then be deprived of an opportunity of working on another road. Many men, he said, are working under assumed names because they left the service on account of a strike or some minor offense. He thought sufficient information could be obtained by an examination and investigation into whether a man was in the habit of using intoxicants. "So far as we are concerned you cannot go too strong on Rule G," remarked Mr. Stone, "but I would like to see it applied to officials as well as employees."

Mr. Deguire also introduced an exhibit based on information furnished by the local chairman of the firemen's organization to show the effects of larger engines and the business depression on the firemen. Eighty per cent of the chairmen had reported 6,312 firemen who had been taken off the firemen's list, and were

either out of work or had gone into some other work, and he read various letters showing the condition of distress many of them and their families were in.

David B. Robertson, vice-president of the Brotherhood of Locomotive Firemen and Enginemen, presented an exhibit made up of quotations from the proceedings of the Master Mechanics' Association, the Traveling Engineers' Association, the *Railway Age Gazette*, Locomotive Engineering and the *Railway World*. These included statements by leading railway authorities as to the effect of the introduction of larger engines and superheaters in the way of producing a greater tonnage at a less wage cost per ton mile for crews, and included statements by W. L. Park, vice-president of the Illinois Central, who is a member of the board of arbitration, as to the increased responsibility and efficiency of engineers with the larger engines.

W. S. Stone, grand chief of the engineers, introduced correspondence he had had with the Interstate Commerce Commission regarding a statement made by Mr. Park which Mr. Stone said indicated that the Interstate Commerce Commission favored surprise tests. He and Mr. Carter had written to the Interstate Commerce Commission enclosing a copy of the testimony bearing on surprise tests and asking for a statement of the commission's position. The reply written by Commissioner McChord said in part: "The commission does not attempt to interfere directly or indirectly with the railroad companies or their officials in the exercise of their discretion affecting the personnel of their employees. The commission is absolutely without the authority of law to interfere between the railroad company and its employees in any matter affecting the physical fitness, competency or discipline of such employees, nor has the commission ever attempted to exercise any such jurisdiction."

Mr. Stone also presented evidence regarding a number of surprise tests which he considered unfair and also a large amount of testimony regarding the moving of terminals which had compelled the men to move their homes, often at a great sacrifice, he said.

D. H. Bremerman, of the Chicago, Burlington & Quincy, testified regarding an exhibit consisting of 326 large pages comparing schedule rates and rules of engineers and firemen in the west, east, and southwest, in detail, together with 16 articles comprising the men's demands which showed that western rates generally were higher than those in the east.

## LOCOMOTIVE HEADLIGHTS IN VERMONT

The Public Service Commission of Vermont has issued an order, effective April 1, 1915, concerning the use of headlights on locomotives and also the providing of cab lights to illuminate the air, water and steam gages and to permit the reading of orders. After hearings and a study of the problem the commission came to the conclusion that a headlight with power sufficient to project light plainly 450 ft. in front of the locomotive would be amply sufficient to perform the following functions of a headlight:

1. Marker to designate the front end of the train.
2. Warning to the public and employees of the approach of a train.
3. Illumination of numbers on the headlight case.
4. Illumination of the track ahead of the locomotive sufficient to allow the engineman to readily perform his duties while operating in and out of terminals, siding, switching, and to pick up the various signs and signals on the run. Also illuminate the track for a fair distance ahead.

The commission, however, was of the opinion that the specification for such a light should be more definite than merely stating that the light should show plainly for 450 ft. in advance of the engine and arrived at the conclusion that a headlight producing not less than 2,500 apparent beam candle-power when measured with the aid of a reflector, the rating being in accordance with the average of the center readings between 500 and 1,000 ft. ahead and upon a reference plane 3 ft. above the

rails, will produce a sufficient light to illuminate the track for at least 450 ft. ahead of the locomotive and to properly perform the functions above enumerated.

No evidence whatever was adduced at the hearing in any way referring to cablights.

It is ordered that every railroad corporation doing business within the state shall equip, maintain and use upon its locomotives operated within the state, excepting locomotives used exclusively in yard service and locomotives operated exclusively during the period from one hour before sunrise to one hour after sunset, headlights of not less than 2,500 apparent beam candle-power when measured with the aid of a reflector, rated in accordance with the average of the center readings between 500 and 1,000 ft. ahead and upon a reference plane 3 ft. above the rails; and shall equip, maintain and use upon all locomotives operated within the state cablights of sufficient intensity to plainly illuminate the air, water and steam gages and to permit the reading of orders thereby.

### TRAIN ACCIDENTS IN DECEMBER<sup>1</sup>

The following is a list of the most notable train accidents that occurred on railways of the United States in the month of December, 1914:

December, 1917.

Collisions						
Date	Road	Place	Kind of accident	Kind of train	Kil'd	Inj'd
9.	Phila. & Reading.....	Royersford	xc	P. & F.	2	2
24.	Southern Pacific.....	Imlay, Nev.	rc	P. & P.	0	16
26.	Pere Marquette.....	Hartford, Mich.	xc	F. & P.	0	6
	K. L. S. & C.....					
Derailments						
Date	Road	Place	Cause of derailm't	Kind of train	Kil'd	Inj'd
10.	St. Louis & S. F.....	Joplin	.....	P.	0	19
†13.	C., Rock I. & P.....	Northfield	b. rail	P.	1	22
17.	Baltimore & Ohio....	Weston, W. Va.	.....	F.	0	2
17.	Western Maryland....	Thomas, W. Va.	runaway	F.	1	3
†18.	Southern .....	Jetersville	d. track	P.	1	20
19.	Pennsylvania .....	Dotter	ms	P.	0	3
19.	Western & Atlantic....	Emerson	.....	P.	2	9
26.	Gulf C. & S. F.....	Blum	b. rail	P.	0	2

The trains in collision at Royersford, Pa., on the 9th were the Williamsport express and a freight train headed in the same direction. The freight was moving out of a side track to the main line, and its engine was struck by the passenger engine. Both engines were overturned. Both enginemen were killed and two other employees were injured. This collision occurred in the night. The men in charge of the freight assumed that the passenger train had passed by when in fact the train which had passed was another; and it appears that they moved their train from the siding to the main track in the face of an indication in the switch indicator showing that the main track was occupied by an approaching train.

The trains in collision at Imlay, Nev., on the 24th were the first and second sections of westbound passenger No. 19. The second section ran into the rear of the first, and eight passengers in the observation car of the leading train were injured. The collision was due to disregard of distant and home automatic block signals. Besides this the engineman entered the yard not under control and the flagman of the leading train used neither torpedoes nor fuses.

At the crossing in Hartford, Mich., on the evening of December 26 a freight train of the Pere Marquette ran into a passenger train of the Kalamazoo, Lake Shore & Chicago, and the rear car of the passenger train was overturned and fell down a bank. Six passengers were injured.

The train derailed near Joplin, Mo., on the morning of the

tenth was westbound passenger No. 9; three passenger cars were ditched. Seventeen passengers and two trainmen were injured.

The train derailed near Northfield, Minn., on the 13th was southbound passenger No. 68; and five cars fell down a bank. One passenger was killed and twenty passengers and two trainmen were injured. The cause of the derailment was a broken rail.

The train derailed near Weston, W. Va., on the 17th was an eastbound freight and 27 cars were wrecked. Two trainmen were injured. The train became uncontrollable on a steep descending grade because of trouble with the air brakes on account of intense cold weather, and the engine ran off the track at a curve.

The train derailed at Thomas, W. Va., on the night of December 17 was a westbound freight and the engine and 10 cars fell down a bank. The train became uncontrollable on a steep descending grade and the engine jumped the track at a curve. One brakeman was killed and the engineman and two other trainmen were injured. It appears that on this grade, which is 3 per cent, the rule is to limit the speed by the use of the hand brakes; that this was not effectively done, and that in addition to this the engineman lost control of the air, presumably by a slow leak.

The train derailed near Jetersville, Va., on the 18th was southbound passenger No. 13, which, however, was running backward, having exchanged passengers with a northbound train because of a blockade on the road. The engine of No. 13 was running backward, and the tender was the first vehicle to leave the track. One passenger was killed and 13 passengers and seven trainmen were injured. The immediate cause of the derailment was a soft spot in the road bed.

The train derailed at Dotter, Pa., on the 19th was northbound passenger No. 73 and the baggage car and mail car were overturned. Three trainmen were injured. The cause of the derailment was a misplaced switch and failure to flag. Work train Extra 6323 took the siding at Dotter to clear for train No. 73. The conductor instructed his brakeman to go ahead and couple the engine onto some cars, stating that he would attend to the main track switch. This conductor reported his train clear of the main track with switch closed and locked before actually doing so, it being his intention to do this afterwards. He continued his conversation with the operator relative to the work he intended doing after No. 73 had passed, and allowed No. 73 to run into the open switch. On account of the weather conditions, the engineman and fireman of No. 73 failed to notice the position of the main track switch target.

The train derailed near Emerson, Ga., on the 19th, was southbound passenger No. 93, and the engine and two cars fell down a bank. Two firemen were killed and three trainmen and six mail clerks were injured. The cause of the derailment was a loose rail.

The train derailed near Blum, Tex., on the morning of the 26th, was passenger No. 16, and five cars left the rails. Two passengers were injured. The cause of the accident was a broken rail.

**Electric Roads.**—Of the accidents to electric cars reported in December, two were notable, one at Leith, Pa., where a trolley car with 54 passengers was overturned in a creek (15 persons injured), and the other in New York, where, in a rear collision of passenger trains on the Sixth avenue elevated line, December 9, one passenger and one trainman were killed and 15 or more passengers were injured. This accident was reported in the *Railway Age Gazette* of December 18, page 1158.

**Canada.**—In a rear collision of freight trains of the Wabash, on the Grand Trunk, at Darling Road, Ont., December 10, three trainmen were killed.

**PROTECTED RAILWAY TO THE SUEZ CANAL.**—It is reported from Copenhagen that advices have been received from Berlin to the effect that the Turks, under the direction of German engineers, are constructing a military railroad from Maan to the Suez canal.

<sup>1</sup>Abbreviations and marks used in Accident List:  
rc, Rear collision—bc, butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc. obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.



# Are You Making Friends for Your Railroad\*?

## An Appeal to Every Employee Concerning the Vital Necessity of Directing His Efforts Toward This End

By ROY V. WRIGHT

Managing Editor, *Railway Age Gazette*

President Rea, of the Pennsylvania Railroad, in an address before the New York Chamber of Commerce last month, made this statement: "The railroads, as an act of self-preservation, will always endeavor to make their service and facilities satisfactory and rates reasonable, because only in this way can they *make friends*, encourage business and earn profits."

Senator Root, in addressing the Pan-American Congress at Washington, February 11, 1911, said: "The basis of all intercourse, commercial as well as social, necessarily lies in a genuine good understanding that cannot be simulated; people trade with those with whom they have sympathy; their disposition is to *trade with their friends*, the basis of all permanent commercial intercourse is benefit to both parties—not that cut-throat relation which may exist between enemies, where one is trying to take advantage of the other—and a relation based upon mutual respect, good understanding, sympathy and friendship."

In speaking before the National Association of Corporation Schools at its annual convention in Philadelphia last June, A. E. Corbin, assistant sales manager of the Packard Motor Car Company, said: "It is necessary for the Packard, as any other manufacturer, to sell goods in the right place, to the right man, under right conditions. You can't buy salesmen clever enough to overcome a sore customer, and the basic principle of our sales organization is to earn the good will and confidence of our patrons."

The business of the railroads is to sell transportation, and to carry on this work effectively they must follow the same fundamental principles that have made for the success of any other business which depends upon successful salesmanship. In studying the problem of salesmanship one cannot but be surprised at the very outstart by finding that in spite of the large proportion of our people who are engaged in this occupation and the tremendous amount of capital which is involved, the psychologists have almost entirely overlooked the field and are only just beginning to seriously turn their attention to it. We do know, however, something of the general principles which have been responsible for the success of our leading business concerns. Walter Dill Scott, in his "Psychology of Advertising," makes this observation: "The modern business man does his utmost to minister to the pleasure of the customers in his store. He knows that they will place a larger order if they are feeling happy than if they are feeling otherwise. . . . The merchant attempts to please the customer by the appearance of the store, by courteous treatment and by every other possible method."

Stated in another way, the successful salesman realizes the necessity of having the prospective purchaser in a proper mental attitude, and to this end does everything he can to gain his interest and friendship. If you will stop a moment and try critically to analyze the feelings and conditions which cause you to give your trade to the various concerns with which you deal, you can gain some idea of the way in which you are specially attracted by those that seem to take a personal interest in you and have gained your good will and, to a certain extent, your friendship.

The railway's sole business is to give service to the public, and with its forces scattered over hundreds or thousands of miles, it must depend on the good will and friendship of the people along the line to even a greater extent than does the department store or other commercial business; and this is true even where there is no competition. The politician, for instance, stands ever ready to push himself into the limelight, and where the attitude

of even a small part of the community is antagonistic to the railway, and the others are largely indifferent, untold damage may be done almost thoughtlessly by the promotion of unwise legislation or regulation. We all know also of the unreasonable and often ridiculous jury awards which have been made against the railways in unfriendly communities.

It therefore behooves railway executives to bend every energy toward making friends with the public. This is a stupendous task—a man's job—and yet not an impossible one; nor can it be accomplished in a brief period of time. Every employee who comes at all in contact with the public in the discharge of his duties—and practically all of them do to a greater or less extent—must be made to feel a broad and, at the same time, intense interest in the work of the road and must realize the necessity of dealing courteously with those with whom he comes in contact, thus doing his part to develop a friendly feeling toward the road. If the employee is unaccommodating or too busy to be courteous, or, as is true in some cases, is willing to criticize and abuse his employer, then the public is sure to develop a feeling of indifference and antagonism toward the road. We may express this in even stronger terms and say that ordinary acts are sure to cause friction unless courtesy is used as a lubricant. The public knows the spirit of the railroad only as it is reflected through the actions and attitude of its employees. It is a realization of this that has inspired the railway employees' magazines to unceasingly preach courtesy and to draw attention to especially noteworthy acts of thoughtfulness or courtesy on the part of employees.

### COURTESY A REAL ASSET

Who can estimate the value to the Pennsylvania Railroad of the following item which appeared recently in its employees' bulletin under the head of "Making Traveling a Pleasure?"

This letter tells its own story: "Permit me to call your attention to the courtesy of your clerk, J. C. Simpson, at Scottdale, Pa., in forwarding to me my spectacles, which I carelessly left in the waiting room on Tuesday. His thoughtfulness, in obtaining my name and address from Mr. Blank, with whom he saw me talking, is, in my opinion, commendable. It is such incidents as this that tend to make Pennsylvania Railroad traveling a pleasure."

In the same bulletin, under the title of "Making Friends for the Railroad," the story of a courteous performance of duty on the part of Conductor Frank Burns, of the Erie division, is introduced with this paragraph: "The kind of treatment passengers and shippers receive in the ordinary day-to-day affairs from those on the railroad with whom they come in contact largely determines the number of friends made for the railroad that day."

Every employee in every department can help make friends for the railroad, and the examples which follow are intended to be suggestive to that end. The field, however, is entirely too broad to be covered in any single article or discussion. My only hope is to bring out not so much the concrete methods which should be followed by the members of each department, as the spirit which should dominate every one of the employees of a progressive railroad.

The other morning, while crossing the Hudson River on the ferryboat, I met a friend who is in business in New York City and receives a large amount of material in carload lots. He has always impressed me with his good business judgment and broad-minded views. Much to my surprise when the question came up as to the railway situation, he expressed himself strongly as being entirely out of sympathy with the roads. Questioning soon developed the reason for this. Much of the material which he receives is shipped in standard size packages which are practically

\*From an address on "Making Friends," before the New England Railroad Club, January 12, 1915.

uniform in weight. Because of errors which have been made in the past in the freight bills, it is the custom before accepting a car to check over the bill carefully. If there is an overcharge it is the practice to refuse to accept the car, because if it is accepted and the freight is paid it requires many months, possibly more than a year, to secure the rebate, and even then it is not always paid. If the car is refused, someone higher up gets busy and has the weights checked at once and the freight bill is corrected accordingly. Can you blame the merchant for looking at things as he does?

Contrast this with the practice of handling loss and damage claims on another road. The agents are authorized to pay such claims up to \$50 from the cash drawer. I happened to make an inspection trip with the general manager of the road several months ago, when he was informed of a bad freight wreck in which 20 cars had been derailed, the contents of all of them being more or less damaged. Several men were at once put to work in listing up the freight shipments in the cars, and the parties to whom they were consigned. The agents were immediately notified to advise the consignees that their shipments had been delayed because of the wreck, but would be forwarded as quickly as possible. They were also advised to go over each shipment with the consignee when it was received and determine the exact amount of damage and pay for it in cash.

The practice of having special traffic representatives solicit business in the territory served by the road and give promises of performance and delivery is not always conducive to the best interests in making friends among shippers. At least one road, realizing this, has placed the solicitation of business in the hands of the operating department. The station agent is given additional help so that he can devote a considerable part of his time to keeping in touch with the business men of the community. He reports to the division superintendent on all matters concerning operation and traffic, and is regarded by the community as the railroad's representative at that place. Because he understands the conditions of operation he is able to deal more satisfactorily with the shippers and receivers of freight, and the co-operation which he receives from the other members of the operating organization makes it possible to give the very best service possible.

#### THE DEVELOPMENT DEPARTMENT

The remarkable work which has been done on a number of roads in attracting desirable immigrants and industrial establishments to the territory served, and in demonstrating the advantages of better agricultural, horticultural and dairying methods, and developing market bureaus, has been a most important factor in making friends for these roads. Here is a striking instance of this: The fence along the right-of-way of a certain railroad became defective and a cow strayed out on the track and was killed. The station agent who was authorized to settle the claim interviewed the owner. It is the practice on this road in this particular district to settle with the farmers on the basis of \$75 a head for cattle thus killed. Much to the surprise of the agent, the farmer made this proposition: He said that two or three years before he had had the opportunity of buying the cow at a big bargain, and that while he considered it to be worth from \$75 to \$100, he would be glad to call the deal square if the railroad would pay him \$50, or the amount he had paid for the cow in the first place; this because the demonstrator for the railroad had assisted him greatly in securing better results from his land, and he felt that it was only fair to deal with the road in the same spirit. The railroad must, of course, exercise proper care in making settlement for damage of this sort, in order that it will not be imposed upon; but there is little excuse for the haggling and unbusinesslike methods which are sometimes employed.

A certain railway advertises a natural wonder on its lines so thoroughly that it is known almost the world over, and Americans as well as foreigners make a point of visiting it if they have occasion to pass anywhere within a few hundred miles of it. The passenger station at this point, through which

thousands and thousands of travelers from home and abroad pass each year, is old and usually in an untidy condition. Naturally while visiting this place for a few hours you want to check your hand baggage and be free of its care. Twice when I have done this I have been forced to miss my train because, although I allowed a generous amount of time in which to secure the baggage, the check room was being handled by ridiculously inefficient help. The contrast between the magnificent scenery which one had left a few minutes before and the filthy, ill-kept waiting rooms is such as to disgust the traveler and put him in anything but a good humor toward the corporation which operates the station.

On the other hand, consider a railroad which runs through a sparsely settled territory and has a large number of small stations to maintain. It awoke to the realization that if it wished to attract newcomers and business it would be a good idea to make the stations and the station grounds as attractive as possible. Usually the district around the railroad station is the least attractive part of a town or city. It was remarkable how quickly the movement on the part of the railway seemed to influence the industries located near the station, and the resulting improvement was soon commented on most favorably by the commercial men who had occasion to visit the towns. More than this, the stations themselves, and particularly the toilet rooms, were so improved and maintained that the commercial travelers began to talk about the better service and thus boost the railroad.

#### THE TIMID TRAVELER

Railroad men become so accustomed to traveling that it is difficult for them to realize the timidity and fear with which the occasional traveler starts out on a journey. The chief operating officer of one of the large systems, in speaking to a group of his subordinates, emphasized the necessity for keeping a lookout for these timid people, both in the stations and on the trains, and trying to make them feel at home. A pleasant word or a little friendly advice to travelers of this kind may often be returned many times over in the friendly interest which may be created toward the railroad. A surly conductor or a grouchy station employee may often needlessly drive business away by a simple act of discourtesy—business which the traffic representatives can only regain at a considerable expenditure of time and energy, if at all. It is difficult to train and coach the thousands of employees scattered over hundreds of miles of railroad to be courteous. It can only be done by making it a distinct matter of policy and having it religiously observed from the highest officer down. The employee in trying to deal courteously with the public often has his good nature strained near the breaking point, let alone the elastic limit. He must remember, however, that there are many small people in this world and that he cannot afford to let himself drop to their level.

Handling personal injury claims is one of the most troublesome problems of railway operation. Listen to the advice given by H. B. Bull, chief claim agent of the Illinois Central, in his address at the convention of the National Association of Railway Claim Agents, held in St. Paul last May:

I know but one rule that may be safely followed in the adjustment of personal injury claims—that negotiations should be conducted upon the high plane of openness and fairness. A railroad company, with its property constantly exposed and subject to attack, must for its protection and defense rely upon its own reputation for fair dealing with its employees, its patrons and the public. The deportment of its claim agents, who are constantly in touch with the public, has much to do with placing the reputation of a railway company. If they go about their work inspired by high and honorable resolutions, their efforts will not only be rewarded as they go along, but will assist most materially in establishing for their company a good name, which is the most valuable asset a railway company can have and which, when once enthroned, is as immutable as virtue and truth. A corporation can only act through its agents, and unless their acts are scrupulously correct it deserves to be condemned.

For the claim agent to preserve this attitude and at the same time prevent his company from being imposed upon by sharp practices is not an easy or a simple task.



The "safety first" movement has done much to secure the interest of the public generally, and this is particularly true in connection with the campaigns which some of the roads have waged to educate the school children and the employees of shops and factories near the tracks, to the necessity of keeping off railroad property and in using reasonable intelligence in guarding against accidents.

One way in which the operating officers can do much to hold the confidence of the public is to be very jealous of anything which interferes with the giving of good service. Fast freight train schedules are all well enough, but they are a detriment in that they cause disappointment and friction if they are not strictly lived up to. Regular dependable service, even if slower, usually keeps the patrons in a much better frame of mind.

#### SELECTION OF EMPLOYEES

Far greater care should be given to the selection and training of employees. In the first place, men should be selected from the immediate territory served by the railroad. Every employee should be carefully trained and his qualifications and progress should be a matter of record, so that he can have every opportunity for advancement and not be pushed aside to make way for a newcomer from some other road. This will accomplish two things: Not only will it encourage the best type of young men to enter the service and strive for advancement, but the communities from which they come will watch their progress with constant interest and will naturally be more friendly to the railroad.

Welfare work as it is promoted by many of the roads means much to the communities served, as well as to the men. The railroads were among the first of our industrial concerns to establish old age pensions and relief funds. Untold benefit has been done to many communities because of the establishment of railroad Y. M. C. A.'s at the terminals. These, in addition to providing clean, comfortable and inspiring surroundings for the men at their lay-over points, have meant much to the communities in which they have been placed because of their influence for good upon the immediate neighborhood. Saloons, cheap and uncomfortable rooming houses and other evils have been driven out with the advent of institutions of this sort.

Railroads have been known to place their medical staffs at the disposal of communities in efforts to drive out infectious diseases. We know also of their generosity when floods, earthquakes or fires have come, in rescuing the imperilled people and their goods and bringing them to places of safety. All of these things have been influential in making good friends.

Railroads sell transportation for cash. Unfortunately they do not all pay for the material which they purchase in the same way. I have in mind one road which has lost some very good friends because of long and apparently inexcusable delays in paying bills.

The purchasing agent is an important factor in making friends of the manufacturers on the system which he serves, by as far as may be consistent ordering material from them rather than from foreign concerns. I have seen a chief purchasing officer go into a manufacturer's plant, after explaining to him that the cost of his product was too high, and show the manufacturer how he could design and produce his device in a way which would bring it within the reach of the railroad.

Nothing is more annoying to a merchant than to receive a shipment of goods in a damaged condition, and this even if his claim is paid immediately and in cash. Much of this damage is caused by the carelessness of employees in handling and loading the freight, rough handling in switching, or the use of defective cars. What a wonderful thing it would be from the standpoint of making and keeping friends for the road if all the employees would co-operate to better these conditions. The St. Louis & San Francisco has already started a movement for the prevention of freight claims along the lines of the safety first campaign. I am wondering whether the actual saving in money, much as it may be, will not be of less importance than

the satisfied patrons who will be protected from the annoyance of useless delays and damage.

Very little has been said in the foregoing as to how the employees of the maintenance of way and mechanical departments may lend their aid in making friends for the railroad. This does not mean, however, that these men cannot give very valuable service in that direction. For instance, the division engineer, roadmasters, section foremen and section men continually come in contact with the people along the line and by their attitude can do much to encourage a friendly feeling on the part of the public. This is true also of many of the employees of the mechanical department. Cleanliness and tidiness of yards, engine terminals and shop plants may exert a strong moral influence upon the immediate neighborhood and set a higher standard for the community. Too much care cannot be taken to prevent or minimize nuisances, such as excessive smoke, unnecessary noise and things of that sort. Railway employees should also be encouraged to take an active interest in the welfare and upbuilding of the community in which they work and live.

Have you ever had a glow which warmed you up all over when the man behind the stamp window at the postoffice said, "Thank you," or really acted as if he were human? Government employees can possibly afford to act like autocrats, but railway employees cannot. What a shock it would be to some railroad officers if they could disguise themselves and drop into the reception rooms of their offices and try to call on themselves or secure information from their clerks and door tenders.

During the course of a recent trip on a certain railroad, I had occasion to take breakfast in the dining car. When the waiter handed me the menu card, he also placed a small cup of coffee before me. I explained that I had not ordered it. His reply was "That's all right, boss, we furnish each guest with a demi-tasse free of charge. People seem to enjoy it while waiting for their breakfast." It was a small courtesy, costing practically nothing, and yet unconsciously it raised that road to a much higher place in my estimation. Does it pay? Do you like to be treated like a human being? The public, distant and cold as it may seem, is made up of individuals, each one of whom likes to be treated with consideration and courtesy, and is usually quick to respond to the spirit of such treatment.

#### IN A NUT SHELL

In July, 1911, a large group of distinguished representatives of the iron and steel industry from all over the world met in Brussels to consider the formation of an organization to discuss the economical, ethical and sociological problems connected with their business. Judge Elbert H. Gary, chairman of the United States Steel Corporation, was asked to preside over the meeting, and in an address in which he advocated the very highest ideals in business, *and as a matter of business*, he said: "There should be established and continuously maintained a business friendship which compels one to feel the same concern for his neighbor that he has for himself. It is no less in principle than the Golden Rule applied to business."

This is very different from the homely philosophy of Dave Harum—"Do unto the other fellow the way he'd like to do unto you, an' do it fust"—and yet if we study Dave's actions closely we find that except as they related to horse trading, he lived far more nearly in accord with the ideals expressed by Judge Gary than his modesty allowed him to admit. One thing we must realize, and that is that the day of sharp practice in business is fast passing away—in fact is already a matter of history with many of our better class institutions and commercial organizations. There can be no question as to the handwriting on the wall. To my mind the really vital problem of our railroads today is a full realization of the necessity for "making friends" of the public by inspiring each one of the employees to follow the spirit of the slogan "The Public Be Pleased," which after all is only a literal application of the Golden Rule to the transportation business.

# True Theory of Railroad Operating Records

## Slow Progress Made in Railroad Statistical Science; the Importance of Educating Railroad Statisticians

BY F. LINCOLN HUTCHINS

To be efficient records must be true to facts; they must cover all needed facts; they must be in hand as soon as the condition of transmission permits; and they must be of low cost. To be true to facts they must be of simple units; to cover all the facts they must be prepared for all units separately; to be available they must be aggregated daily; to be of low cost they must be under the supervision of one competent man.

A simple unit is any exactly defined element, a knowledge of which may be had by simple sorting and counting. Records must be self-proving, that is, the number of subordinate units must agree with the number of general elements of which they are parts. Money units cannot be used to measure physical operation, as they contain too many variables. Physical operation can only be known by units of physical elements.

Judged by these laws railroads have few, if any, satisfactory records; while they are staggering under a mass of reports which give little basis for correct judgments and cause great waste of revenue in needless expenditure.

The attention of American railroad officers should be directed to the most important thing in connection with their efforts to secure efficient operation. Proper management of records would result in a better knowledge and hence in better control of operation, as well as a greater saving of money now wasted in clerical work and report forms. Efficient operation cannot be measured by the amount of expenditures; money units contain too many variables to satisfy a stable "bench mark"; a difference in wage scale seldom affects the efficiency while greatly changing the costs; a reduced pay-roll may be, and often is, accompanied by a much greater loss in efficiency, as when a low-priced man is cut off requiring a higher-priced man to do the work. On the other hand an increased pay-roll may result in increased efficiency and lessened cost, through effective supervision and the relief of high-priced men from cheap work through the employment of lower-grade assistants; in both of these cases a money unit would produce a mistaken judgment.

An increase in revenue should not, per se, justify an increased cost. A change in the character of traffic, or in rates received for the same traffic, should cause no change in cost. An increase of revenue caused by acquisition of new traffic flowing in a direction opposite to that already in hand should result in a decreased cost per unit, and does not call for an increase in total expense. On the other hand a diminution in revenue does not justify neglect of proper maintenance, or even of operating costs per unit. A large part of the cost is entirely independent of revenue, being in the nature of a fixed charge having no relation to the amount of the revenue.

Genuine efficiency depends upon the proper use of accurate records. No efficient action in human affairs is knowable until records of results determine what is efficient. The art of railroading is too recent to have accumulated a fund of exact records. Only in the most superficial sense can it be said to have any records. The progress of rail transportation has been too rapid to permit of careful attention to securing records; the emphasis has been placed on doing the work immediately in hand as best it could be done under the personal direction of those having more or less experience to guide them; there has been no thought of seeking records of others' experiences, or of making records for the guidance of others in similar work.

Again, the men who have developed the art of rail transportation have not been statisticians; their training and inclinations have been antagonistic to statistical information; there still exists among railroad managers a veiled contempt for any statistical determination of the efficiency of operation. This atti-

tude results, in part, from their knowledge of the multiplicities and ever-changing conditions of operation, in part from their experience with current practice in report-making, through which partial, complex, and misleading conclusions are drawn, unless they are supplemented by personal observation and knowledge.

No railroad in the United States has a comprehensive, adequate statistical method by which to control its operations. The reason is obvious, for in the days of short lines, over which the superintendent could make daily trips, thus keeping in personal touch with all of its details, there were few other than the financial reports. As lines became extended and the new combinations lengthened the jurisdiction of the manager, information supplementing personal observation was found necessary, and this was secured through reports made upon blank forms sent out to the party upon the ground to be filled in and returned. Such report blanks were hastily prepared, to cover the particular need then in mind, by men who had no statistical training; and by different departments independently, leading to duplication and conflicting reports; no attempt was made to correlate or co-ordinate these report forms to fit them for other use; such reports were often continued long after the particular need had passed, or was better supplied in other ways, lumbering up the files and entailing needless clerical costs. Such reports, being unscientifically prepared and lacking the exact definitions needful to inform the makers as to just what was to be included, failed to convey exact information, and when new information was needed the effort to secure it led to the formation of new blanks, prepared in the same illogical manner, until to such an extent has this grown that the roads in the present day are staggering under a tremendous accumulation of reports, of which many are worthless so far as the giving of exact and reliable information is concerned.

It may be observed that the railroads are in an exceptionally favorable situation to obtain ideal statistical records. The units are few and simple, so that they may be exactly defined. The power to secure accurate figures of such units is ample and complete. These two fundamentals comprise the main requisites of scientific statistics, which require only the correct application of statistical methods to produce accurate results. Railroads are manufacturing entities producing a service; this product is passengers and merchandise transported; the units are passengers and freight tons carried one mile; the efficiency is determined by the time and effort expended to produce the results, not by the money received for that service, which varies through causes entirely unconnected with the ratio of effect produced to the energy expended in producing it.

It follows, then, that performance records must be divorced from financial reports; bookkeepers, accountants, and auditors make poor statisticians, because their training is wholly along the line of monetary values, and this becomes too ingrained in their natures to permit them to think in other terms; they are also too much involved in watching financial results to enable them to take a broad view of purely operating statistics. From the absolute fact that with every increase in efficiency there follows a lessened cost per unit, even when the total cost is increased, it is seen that to compare costs is entirely misleading. This is a thing that the financial man has great difficulty in realizing.

Point of view is perhaps the most important thing in the establishment of statistics. To the president and directors the single point of view is net earnings. Not so to the operating man, whose point of view should be focused upon operating methods which will directly affect the net earning result. Hence



the present tonnage records are very defective in that they do not induce the proper point of view for the operating man. For instance, credit for gross tonnage, including resistance allowances, has no direct relation to earnings, for it is only the paying load which yields earnings. Revenue tonnage is the only business which affects earnings, and hence should be the unit view point. A superintendent having this as his goal will be intensely interested in the efficient loading of cars and in his revenue train-loading, to avoid all light hauls so far as possible.

He will, if encouraged, criticize the direction of the transportation office in the matter of moving empties and routing loads, which criticisms may show that damaging practices are prevalent. Another correlative viewpoint is the tractive power used to haul that earning tonnage within the time in which it is in use. A railroad has a very heavy overhead expense dominated by the element of time, and this expense should be brought home to the operating man. With his viewpoint fixed upon the greatest possible number of revenue tons, with the least possible tractive power time, the operating man would work toward the goal of the president, namely, increased net earnings.

To obtain accurate statistical knowledge it is necessary to obtain the facts by means of an individual unit record, which may be counted; this means that the unit must be so exactly defined as to enable the illiterate to comprehend it, and the record must be the number of times that it occurs in time and space. Such a unit record aggregated gives the basis from which any deductions may be obtained; combined with other aggregates, similarly obtained, results may be obtained to answer any inquiry that may be made. Such unit records suffice for all needs, hence it is possible to abolish all duplication by any department and simplify the statistical effort. To be exact records must be made currently with the performance, by the party intimately associated with the work; such records should carry notations of any abnormalities, or unusual situations, to the end that it may never be necessary to make inquiry as to the cause of any departure from normal results; this feature would afford great relief to all departments that are now so burdened with efforts to explain past occurrences.

The post-mortems, now so largely indulged in, are costing the roads a prodigious and unappreciated amount of money, with no resulting benefit; further than that, they divert the minds of the supervising officers from attention to the immediate pressing problems of operation and thus detract from their efficiency. It is doubtless true that at some points there is great efficiency as regards some unit of performance; unit records would bring this into view and a study of causes would serve to raise the efficiency of this element upon every part of the system.

Competent arrangement of records upon the statistical plan makes all records self-proving; that is, each group of records must be arranged in a descending order from the most general to the particular, wherein the total of the particulars must agree with the total of the general if the records are correctly made; here is a current proof of accuracy, and with daily aggregations, errors would be immediately discovered and corrections applied.

With proper unit records it is as simple and easy to aggregate the particulars separately, as to first mix up incongruous elements as is now done; having aggregates of each particular permits of every possible combination from which to deduct the answer to any question; not only so but the aggregates still remain to furnish the answer to any other question arising at any time, without seeking new information by means of special reports.

The accumulation of all data should be by means of simple sorting and counting; the facility with which sorting may be done is evidenced by the rapidity and accuracy with which mails are handled by the United States postal department. In postal cars with 80 separations the average is 25 sortings per minute, in post offices from 45 to 50 pieces of matter per minute when making primary separations. With uniform records of railroad data it would be much more rapid because of the absence of irregular addresses and puzzling writing.

Having fixed the units the next step is to determine what information is necessary for an adequate and effective control of operation. Care must be taken to eliminate all reports which simply satisfy curiosity, an element which is quite dominant in many of the reports now in use. Doing away with these would materially reduce the cost and make more efficient the unit data obtained. The original record having been made it should pass immediately out of the hands of the party making it into a record bureau, and all subsequent use of that record should be developed by the record force, trained to the efficient handling of it; having no incentive to blur or misuse it, a condition that now vitiates some reports. Relieving the operating department of all record work would liberate more clerks than would be required by a record department performing the same functions. Record bureaus, conveniently placed, could make efficient use of mechanical devices to expedite and cheapen the work, the co-ordination of records making it possible for the bureau to answer any inquiry with the least time and expense. This method would abolish all petty reports now made by the departments, divisions and localities; relieve local parties from all report making, now so indifferently performed, and—which is most important—would save the mass of correspondence, now indulged in, to clear up doubtful points, correct errors and to obtain explanations. The ultimate aim would be to have daily recourse concurrently aggregated so that accurate results may be available as soon after performance as the time for the transmission of the data permitted.

Substituting scientific records for the present unscientific reports may be made a very gradual process during which the present official routine may be least disturbed. After the complete scheme has been worked out, with a definite unit place provided for every possible refinement in records, it only remains to gradually introduce the new as the existing reports are exhausted or become obsolescent. Only when the plan has been sufficiently instituted will there be a necessity for the creation of a distinct record bureau. It is plainly evident, however, that a competent man must be given supervisory control of all records in order that co-ordination may be secured and a gradual approach made to the ideally efficient method.

An important part of a statistical method is the adoption of adequate symbolization. Provision against duplication is secured by using mnemonic letter symbols for verbs of action, such as—Ad for adjust, Av for advise, Ap for approve, Cl for classify, Cm for communication, Dm for demand, Es for establish.

Differentiation of function is secured by using Roman numerals, such as (1) organization, (2) financial, (3) construction, (4) maintenance, (5) procuring business, and (6) transportation.

Division between the three classes of service may be secured by using a following letter, such as H for personal service, M for material service, C for capital service.

These symbols may be continued down to the last refinement so that simple sorting of the individual units produces an exact result upon which accurate judgment may be obtained.

**RAILWAY CONSTRUCTION IN CHILE.**—The Chilean government, despite the stringency of its financial resources, has resolved to proceed with the construction of the following new lines: Paine to Talagante; a line to connect the Traiguén branch with the main line; the Iquique and the Antofagasta extensions to the Longitudinal Railway; a line from Melpilla to Las Cabras; Valparaíso to Casablanca; San Vicente to Perallillo and Parronal; Valdivia to Los Canelos; Freire to Cunco; Los Angeles to Santa Bárbara and Quillaco; San Clemente to Colorado, with a branch to Queri; San Bernardo to Puente Alto; Quilpe to Melpilla; San Carlos to San Fabian; Artificio to Quincolmo; El Alamo to Molina; Cauquenes to Chanco; Quirihue to Coelemu; Yumbel to Rio Claro; Bulnes to San Ignacio and thence to El Recinto.

# PACIFIC AND MIKADO TYPE LOCOMOTIVES FOR THE NEW ORLEANS & NORTHEASTERN

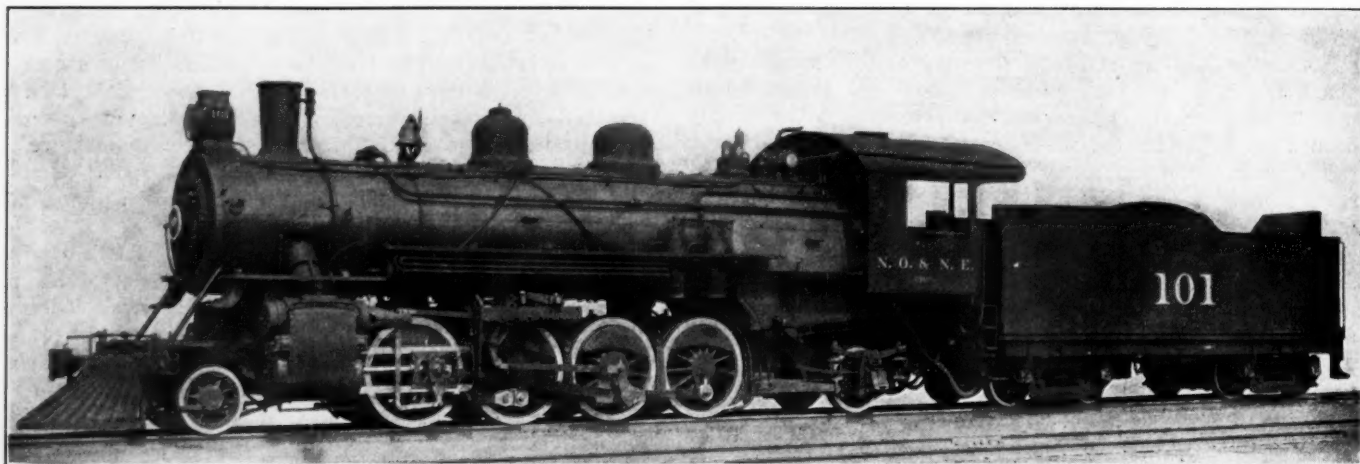
In order to obtain the greatest economy in the maintenance of motive power much attention has been given during the last few years to interchangeability of the detail parts. A majority of the parts subject to wear may very frequently be made interchangeable on locomotives differing widely in type. This is evidenced by a lot of five Pacific and three Mikado type locomotives recently built by the Baldwin Locomotive Works for the New Orleans & Northeastern. With these two types it is not difficult to arrange the wheel base so that interchangeable boilers may be applied. By using driving wheels of suitable diameter duplicate cylinders may also be applied and the proper ratio of adhesion maintained in both types. Among the important details which have been made interchangeable on the

lb. and 40,420 lb., respectively, have been obtained with but slight variations in the factor of adhesion. Piston valves 13 in. in diameter are used, being driven by Walschaert gear.

Vanadium steel has been used in the frames, driving axles and engine truck axles of both types. This material has also been used in the main and side rods of the Pacific type locomotives. All rods for both types are rectangular in section. The rear truck is of the improved Hodges type so arranged as to give a maximum amount of clearance under the ash pan.

These locomotives are built to operate on 75 lb. rails. The grades and curves are generally light, the steepest grades on the main line being 1 per cent. and the sharpest curve 6 deg. The principal dimensions and ratios of both types are given in the following table:

General Data		
	Pacific	Mikado
Gage .....	4 ft. 8½ in.	4 ft. 8½ in.
Service .....	Passenger	Freight



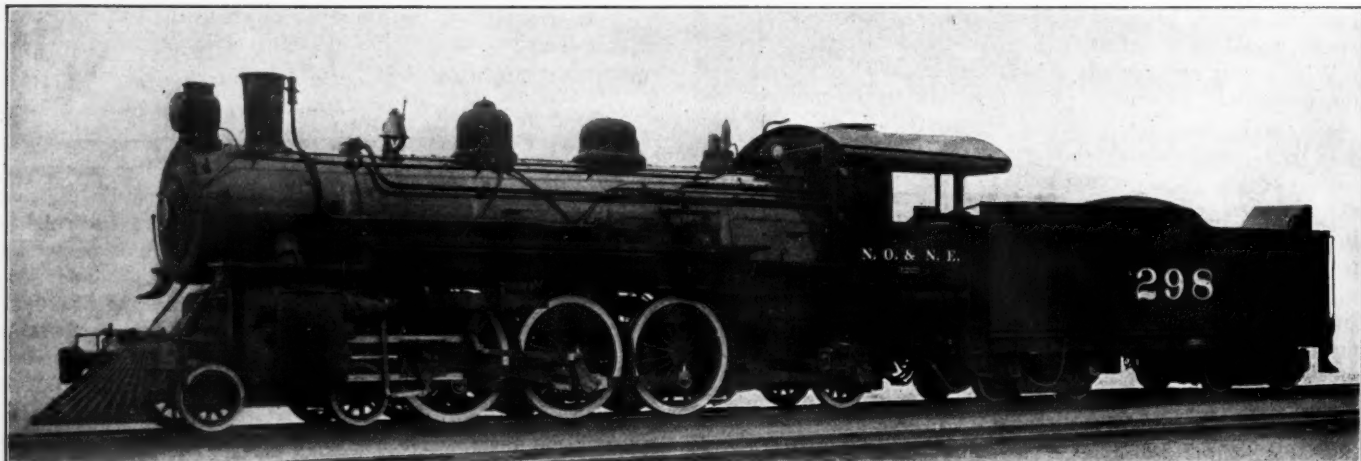
Mikado Type Locomotive, Many Parts of Which are Interchangeable with the Pacific Type

New Orleans & Northeastern locomotives are the boilers and accessories, the cylinders, cylinder and valve chamber heads, cross heads, pistons and rods, piston valves, driving boxes, trailer trucks, foot plates and cabs.

The boilers, which are of the straight top type, are equipped with the Gaines locomotive furnace. A combustion chamber is used in combination with a brick arch supported on water tubes. The superheater is made up of 24 elements and provides a superheating surface of 564 sq. ft. The fittings include power operated fire doors and grate shakers.

The cylinders on both types are simple with a diameter of 22 in. and a stroke of 28 in. With 68 in. driving wheels on the Pacific and 57 in. on the Mikado type, tractive efforts of 33,880

Fuel .....	Bit. coal	Bit. coal
Tractive power .....	33,880 lb.	40,420 lb.
Weight in working order.....	206,700 lb.	209,500 lb.
Weight on drivers.....	130,500 lb.	160,000 lb.
Weight on leading truck.....	43,800 lb.	19,700 lb.
Weight on trailing truck.....	32,400 lb.	29,800 lb.
Weight of engine and tender in working order .....	352,000 lb.	355,000 lb.
Wheel base, driving.....	12 ft. 0 in.	15 ft. 0 in.
Wheel base, total.....	32 ft. 11 in.	33 ft. 6 in.
Wheel base, engine and tender.....	67 ft. 0 in.	67 ft. 7 in.
Ratios		
Weight on drivers ÷ tractive effort...	3.84	3.96
Total weight ÷ tractive effort.....	6.14	5.18
Tractive effort × diam. drivers ÷ total equivalent heating surface†.....	679.2	679.2
Total equivalent heating surface† ÷ grate area .....	73.7	73.7
Tube equivalent heating surface† ÷ fire-box heating surface.....	19.8	19.8



New Orleans & Northeastern Pacific Type Locomotive



Weight on drivers + total equivalent heating surface†	38.5	47.2
Total weight + total equivalent heating surface†	60.9	57.6
Volume both cylinders.....	12.3 cu. ft.	12.3 cu. ft.
Total equivalent heating surface† ÷ vol. cylinders .....	275.3	275.3
Grate area ÷ vol. cylinders.....	3.7	3.7
<b>Cylinders</b>		
Kind .....	Simple	Simple
Diameter and stroke.....	22 in. x 28 in.	22 in. x 28 in.
<b>Valves</b>		
Kind .....	Piston	Piston
Diameter .....	13 in.	13 in.
Lead in full gear.....	¾ in.	¾ in.
<b>Wheels</b>		
Driving, diameter over tires.....	68 in.	57 in.
Driving, thickness of tires.....	4 in.	3½ in.
Driving journals, main, diameter and length .....	9½ in. x 11 in.	9½ in. x 11 in.
Driving journals, others, diameter and length .....	9 in. x 11 in.	9 in. x 11 in.
Engine truck wheels, diameter.....	33 in.	33 in.
Engine truck, journals.....	6½ in. x 10 in.	5½ in. x 10 in.
Trailing truck wheels, diameter.....	40 in.	40 in.
Trailing truck, journals.....	7½ in. x 12 in.	7½ in. x 12 in.
<b>Boiler</b>		
Style .....	Straight	Straight
Working pressure .....	200 lb.	200 lb.
Outside diameter of first ring.....	66 in.	66 in.
Firebox, length and width*.....	110 3/16 in. x 76 in.	110 3/16 in. x 76 in.
Tubes, number and outside diameter.....	172—2 in.	172—2 in.
Flues, number and outside diameter.....	24—5½ in.	24—5½ in.
Tubes and flues, length.....	19 ft. 3 in.	19 ft. 3 in.
Heating surface, tubes.....	2,373 sq. ft.	2,373 sq. ft.
Heating surface, water tubes.....	29 sq. ft.	29 sq. ft.
Heating surface, firebox.....	171 sq. ft.	171 sq. ft.
Heating surface, total.....	2,573 sq. ft.	2,573 sq. ft.
Superheater heating surface.....	546 sq. ft.	546 sq. ft.
Total equivalent heating surface†.....	3,392 sq. ft.	3,392 sq. ft.
Grate area .....	46 sq. ft.	46 sq. ft.
<b>Tender</b>		
Tank .....	Water bottom	Water bottom
Wheels, diameter .....	36 in.	36 in.
Journals, diameter and length.....	5½ in. x 10 in.	5½ in. x 10 in.
Water capacity .....	7,500 gal.	7,500 gal.
Coal capacity .....	14 ton	14 ton

\*Gaines locomotive furnace; length of grate 87 in.

†Total equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

## THE NEW ERA FOR RAILROADS\*

By DANIEL WILLARD

President, Baltimore & Ohio Railroad

The two decisions in the Eastern rate case, taken as a whole, may be truly said to mark the beginning of a new era for the railroads, and I believe that the decisions, when they become better understood, will have, and justly so, the support of all men who think carefully concerning matters of that kind and desire only that fair and reasonable treatment and consideration shall at all times be accorded, with equal impartiality, to all individuals and interests.

While the commission in its two decisions fully recognized the needs of the railroads in Official Classification territory for additional net revenue, and while the chairman of the commission specifically stated that in his opinion the needs of the carriers were even greater than the full amount to be obtained from a 5 per cent increase as requested, it should be kept in mind that the increase immediately granted was, approximately, only one-half of the amount asked for; but other findings and suggestions contained in the decisions are of great potential value, provided the railroads are enabled by the co-operative and affirmative action of the various state commissions, as well as of the federal commission, to put the changes and the reforms suggested into effect. The federal commission, for instance, admitted the contention of the carriers that their expenses had become inelastic, due largely, as shown in the record, to the effect of legislation, such as full crew bills, hours of service laws, increased taxes, etc., and that it was not possible now, as in the past, for the carriers to keep their expenses in harmony with their gross earnings. They found also that it was not true, as claimed by some, that the railroads had spent unduly large amounts in recent years upon maintenance; on the contrary, they ex-

pressed the view that the amount so spent was perhaps even less than it might well have been, and definitely stated that they would view with disfavor efforts to increase net earnings by keeping maintenance charges lower than they ought to be.

They approved the principle of a small uniform and general increase as urged by the railroads, by permitting such an increase to become effective on approximately half of the freight earnings in the Eastern territory. The commission also found that the higher rates of interest which the carriers would undoubtedly be required to pay in the future because of conditions brought about by the European war would be an element which should be considered in determining a fair and reasonable basis of rates. In other words, the commission clearly recognized all the contentions of the carriers concerning the general railroad situation, and specifically stated that it was the duty and the purpose of the commission to assist so far as it properly might in the solution of the whole problem. In furtherance of that thought the commission pointed out various ways in which it expressed the belief that assistance might be looked for, and if our political structure had been developed along the lines that were later on followed in the Dominion of Canada—that is to say, if the federal power had been all-embracing, except as limited by special restrictions, instead of being just the contrary—it would be possible, I believe, with the assistance and support of the federal commission to work out without unreasonable delay a solution of the railroad problem along the lines suggested by the federal commission.

It should be remembered, however, that each one of our forty-nine states, or, more specifically, each one of the eighteen states located in what is known as Official Classification territory, has its own policy concerning the regulation of railroads. In some of the states it is not possible to advance local freight rates, for instance, without the consent of the railroad commission in that state, and in many of the states there are laws limiting passenger fares generally to two cents per mile, although it was very clearly shown by the able counsel retained by the Interstate Commerce Commission to assist it in the development of the rate case that a two-cent passenger rate was clearly unremunerative under most circumstances.

In order, therefore, that the policy outlined by the Interstate Commerce Commission in the Eastern rate case, and which I believe is a broad and constructive one in its possibilities, may be given effect and that the railroads may without undue delay obtain the relief proposed, it will be necessary to have also the friendly and affirmative co-operation of the several states, and this, in view of the searching and prolonged investigation of the federal commission into the whole subject, I think we may fairly expect to be forthcoming. If this is done, I believe the future outlook for the railroads is distinctly more promising than it has been at any time during the last decade.

Undoubtedly, in the actual working out of what may be called a large reformatory program such as is presented, it may, and no doubt will, come about that certain of the carriers as well as certain localities will be required, in the general good, to give up special advantages which may have accrued to them under conditions such as have existed in the past, and this it is to be hoped they will consent to do, having in mind the larger interest of all, and also the certainty that a policy based upon a recognition of the principle of fair and reasonable treatment for all will in the long run and in some way assure to all the rights and privileges to which they are justly entitled.

It has been a source of constant satisfaction to me that the press generally should have taken the attitude it did toward the question as a whole, and while what is said in this letter is simply a personal expression of my own views, I believe that railroad managers generally feel very largely as I do concerning the matters above referred to, and I hope now

\*From a letter to the New York Times, published in its issue of January 20, 1915.

that the public, because better informed, has come to appreciate more clearly the necessities of the railroads, as well as the intimate relationship which exists between the prosperity of the railroads and the prosperity of all others, that we may be able to so work out the problems of the future as to perpetuate the friendly understanding which now seems to be established.

## THE FARMING CODE

A harassed railroad officer has sent us the following, showing that he at least might be willing to share his blessings with other classes of citizens. It is rumored that Congressman Whackem may not introduce this bill in the near future.

### ARTICLE ONE

#### Charges and Prices

Sec. 1. Only one price for a given commodity shall be lawful. A farmer desiring to change a price shall file a schedule thereof with the commission hereby created, which shall go into effect thirty days thereafter unless suspended by the commission at the instance of any consumer.

Sec. 2. No prices shall be increased, however, except upon due proof, the burden whereof shall be upon the farmer, that existing prices are confiscatory of his goods and gear. In its discretion, the commission may refuse to permit any such increase until a valuation by its engineers and accountants shall have been taken. In such valuation, the farmer shall have no credit for past profits invested in new fields or improved structures, but shall be allowed only original cost plus borrowed money invested.

Sec. 3. "Commodity," as used herein, includes all grains, vegetables, livestock, dairy articles, excepting sand, gravel and manure.

### ARTICLE TWO

#### Conduct of Operations

Sec. 4. Every hired man shall work eight hours only per day, not including the Sabbath, and shall not recommence work unless he has completed a period of not less than eighteen hours of absolute rest and quiet. He shall not work on the Lord's Day, nor on legal holidays, nor on Jack Love's birthday.

Sec. 5. Every farmer shall hire one more hired man than his work requires.

Sec. 6. The only permissible exceptions to the two foregoing sections shall be periods of stress resulting from earthquake, Halley's Comet or European invasion.

Sec. 7. All wagons, and all poles and double-trees, shall be provided with couplers, coupling by impact, so that the hired man need not go between the wheels of the wagon and the heels of the horses.

Sec. 8. All wagons shall be supplied with suitable brakes, grab-

irons, stirrups and platforms of standard dimensions to be fixed by the commission.

Sec. 9. All bulls, when moving on the highway or in unfenced areas, shall be equipped with a bell of not less than fifty pounds weight, a steam whistle and an electric headlight of at least 1,100 candle power.

Sec. 10. Sheds shall be built over all fields where hired men have to work in summer.

Sec. 11. All field engines and machinery shall be fenced in; all belting shall be encased in metal housings; and all grindstones, churns, hay-cutters, bulls' horns and other moving parts shall be strongly encased in sheaths for the protection of the hired men.

Sec. 12. All barns, sheds and other outbuildings shall, in cold weather, be adequately heated, and at all times shall be well lighted and policed.

Sec. 13. If a calf is delayed in arriving or is born dead, the farmer shall instantly provide another cow whose calf shall be born that day.

Sec. 14. The commission's inspectors shall weekly inspect all gasoline automobiles. If a cylinder is missing, the farmer must find it before he runs on the road again.

Sec. 14a. The right to mortgage real estate is a franchise reserved to the state. No farmer shall make any mortgage nor incur any indebtedness extending for a period of more than one month, without the written approval of the commission, obtained upon petition and hearing, and upon paying the state treasurer 10 cents for each \$100 of such indebtedness. Indebtedness incurred without such consent shall be void.

### ARTICLE THREE

#### The Commission

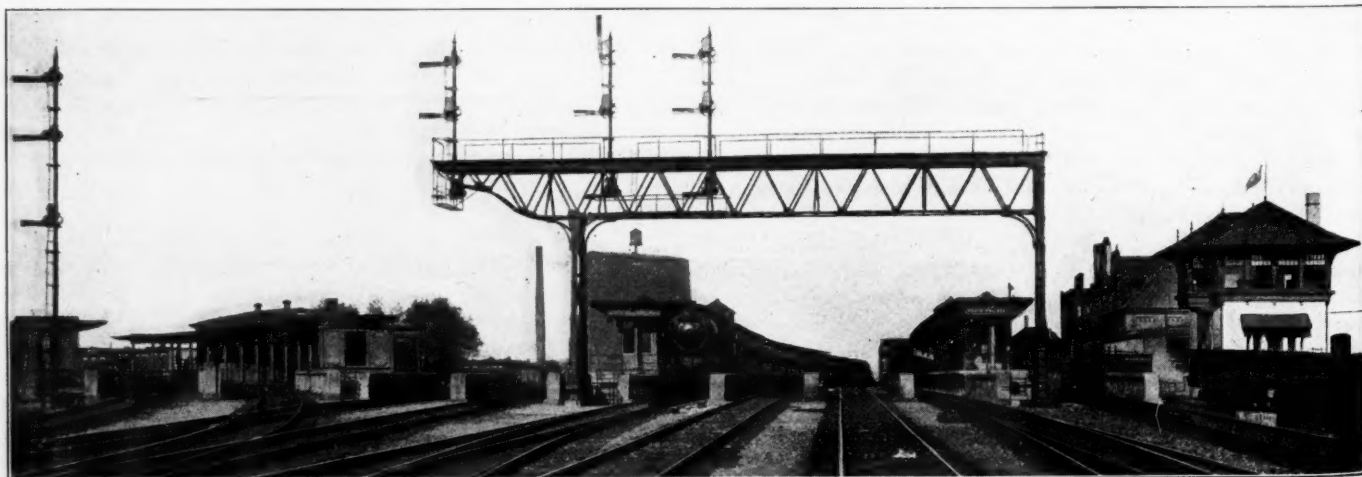
Sec. 15. To enforce this act, a commission of five persons shall be selected by the governor with a view to placating as many shades of political opinion as possible. No commissioner shall, however, be deemed disqualified by lack of previous political or other experience.

## INTERLOCKING AT NORTH PHILADELPHIA

By W. M. Post,

Supervisor of Signals, Pennsylvania Railroad, Jersey City, N. J.

The Pennsylvania recently added four tracks to its four-track line at North Philadelphia, making eight tracks through the station, and also increased its station facilities, which made it necessary to replace the old electro-pneumatic interlocking plant at that point. A 47-lever type F electric interlocking machine, furnished by the Union Switch & Signal Company, was installed, 43 working levers controlling 41 switches and 58 signals east and west of the station. At the same time the automatic block signal sections in the immediate vicinity were shortened from an average



North Philadelphia Passenger Station and Interlocking Plant—Looking East

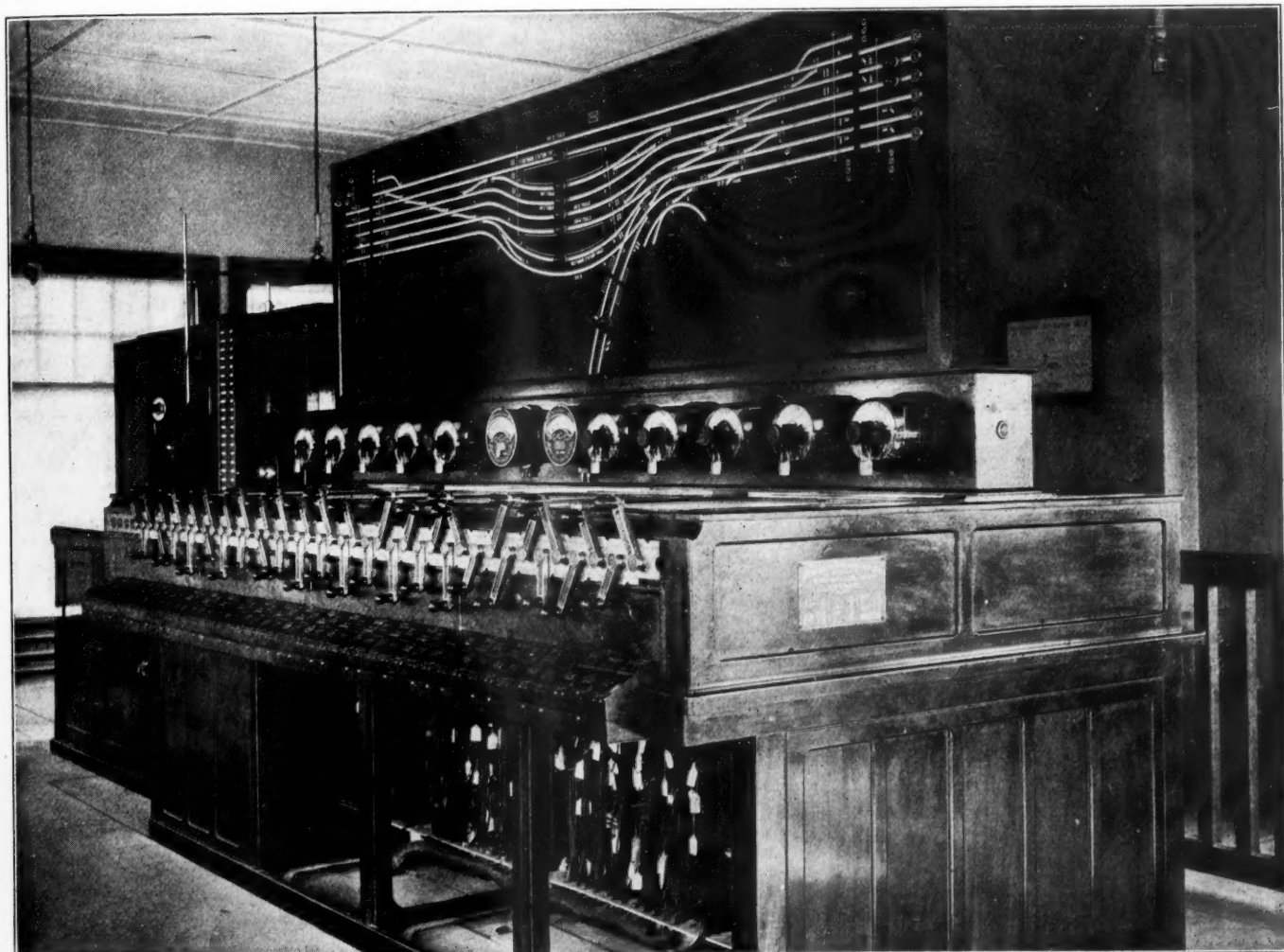


of 4,088 ft. to 3,052 ft. to enable trains more quickly to get away from this congested district; and the automatic signals were changed from two-arm, lower-quadrant, two-position, to one-arm, upper-quadrant, three-position. The distant indication was carried back two blocks, the first distant signal indicating "proceed, prepared to stop at next signal," and the second distant signal indicating "proceed, prepared to pass next signal at medium speed." The interlocking station is a two-story brick building 38 ft. by 20 ft. outside dimensions, with red tile roof, and brick walls covered with concrete, the design harmonizing with the appearance of the bridges and the station surroundings. The relay and indicator rack is directly under the interlocking machine, on the ground floor.

The machine is of the electro-pneumatic design modified for

The switch mechanisms are Union B 3 electric type. The switch is operated through a worm gear direct connected to the operating motors by reduction gears of 25 to 1 for single switches, and 45 to 1 for slips and movable-point frogs. The indication circuit is alternating current and was developed by the Pennsylvania signal department to eliminate the possibility of false indication. All signals are electrically lighted with two 2½-watt 12-volt Mazda bulbs, connected in multiple.

Power is supplied by the Philadelphia Electric Company at 220-volts, 60-cycle, single-phase a. c. Two sets of Edison storage batteries, 100 cells each, of 300 ampere-hours capacity, supply the direct current for the signals, switch motors and indicators. These sets are charged alternately by two mercury arc rectifiers of 30 amperes d. c. capacity, connected in multiple.



Electric Interlocking Machine at North Philadelphia

use with electric power apparatus. Each signal lever controls several signals by means of selection over contacts on switch levers, and through other devices. Both ends of a crossover are controlled by one lever and if one is a slip, the slip and movable point frogs are included in the control of the lever.

Indication lights located directly under the levers in the machine show whether the track circuits which control the electric switch locking and the automatic feature of the signals, are occupied. Electric lights on the track model, on which is painted a diagram of the track layout, indicate the approach of trains and also which one of the station tracks is occupied. Clockwork slow releases, ground detectors and ammeters are mounted in a cabinet over the machine. Mercury slow releases are connected to levers controlling all dwarf signals which are less than 100 ft. from facing-point switches. At one end of the machine there is a telephone test board.

The alternating current for track circuits, switch indication circuits and electric lights is transformed from 220 to 110 volts at the interlocking station and is conducted through the plant on No. 6 feeders. Transformers located at convenient points step down the current again.

All wires were put underground in cypress wood conduit and the wires surrounded with R. S. A. Parolite (petroleum asphaltum) to protect the insulation and guard against damage by rats and mice. The boards were covered with ¾ in. of this material before the conduit was built; the cables and wires were then pulled through, and Parolite heated to about 200 deg. F. was poured in until the wires were covered.

The interlocking is completely equipped with approach, route and electric switch locking. It is nearly a mile from the farthest east to the farthest west interlocked switch and a large share of the operations in the cabin have to be carried on without hav-

ing a good view of the trains that are being dealt with; that is to say, wholly by observing the indication lights in the interlocking machine. The plant was designed by the signal department of the Pennsylvania, A. H. Rudd, signal engineer, and the installation was made by the New York division forces.

## STATE COMMISSION REPORTS

The New York, New Jersey and New Hampshire public service commissions have this week completed their annual reports. As yet only that from New Hampshire has been published in complete form, however, and our reports of the others are made up from advance notices which have been issued. There have been added notices of two special reports from Massachusetts.

### NEW YORK

The New York State Public Service Commission, First district, has presented its eighth annual report to the legislature. The principal activities of the board have to do with the construction of new subway and elevated railroads in New York City, and during the 12 months of 1914, the commission awarded 24 construction contracts, which aggregated in value about \$52,000,000. This is more than double the amount of the contracts given out in 1913. Payments by the city and by the operating companies for new lines aggregated in 1914 about \$26,000,000. The contracts on which work is now in progress total about \$142,000,000. The commission has 2,100 employees and its running expenses for the year were about \$3,000,000. Of this amount \$2,500,000 was chargeable to rapid transit, the preparation of plans, supervision of construction, etc. For the fiscal year ended June 30, 1914, the total number of passengers carried by all street railroads in the First district, that is, elevated, subway and surface lines, was 1,813,204,692, an increase of 43,328,184 over the previous year. The total receipts of such companies for the year were \$94,153,673, an increase of \$2,012,068. Estimating the population of the greater city at 5,400,000, this is \$17.43 per capita for street car fares.

The New York State Public Service Commission, Second district, sent its annual report to the legislature January 15. A detailed account is given of the volume of work which has been done by the commission during the past year, and it is estimated that 25 per cent more work has been done than during any similar period in the past. The number of hearings held during the year was 630, occupying 298 whole days, and 2,195 formal and informal cases have been settled since March 16, the day when the present personnel of the commission was organized.

The commission recommends legislation to give it further authority to suspend proposed rates; a law to amend the long and short haul clause of the railroad law and one to require carriers to furnish shippers with a written statement of rates when called for. The commission has granted 142 certificates of public convenience and necessity for auto-bus lines on the highways. The commission believes that the highway department could attend to this matter, which takes the time of the members from more important things.

The commission also recommends a more businesslike and economical management of the contributions made by the state to the abolition of highway grade crossings. No appropriation for this purpose has been made by the state legislature for three years past, and cases are now pending where the state (which usually pays 25 per cent of such improvements) ought to contribute \$1,000,000. Of the 8,679 grade crossings in New York State, a large share are on state and county highways, and some of the money for abolishing crossings can be taken from the highway funds. The commission strongly recommends the adoption of a definite program of appropriations in order that this great problem may be systematically dealt with.

### MASSACHUSETTS

The Public Service Commission of Massachusetts, in a special report to the legislature, estimates that the amount invested in

the electric railroads of the state is \$226,253,407, including the sum of \$25,982,695 for subways built by the city of Boston. The order of the legislature in this matter was the result of a discussion of proposals to have the electric lines taken over by the state, the cost of which, it will be seen, would be about two hundred millions, plus an annual return of 10 per cent on the investment, which is stipulated in the laws under which most or all of the companies were organized. To get an accurate estimate of the value of the roads, says the commission, it would be necessary to have first a physical valuation of the property, which would cost \$230,000 or more. The commission gives a negative answer to the proposal broached in the legislature, to assess the property adjacent to existing street railway lines for the purpose of raising money with which to purchase them.

### NEW JERSEY

The Board of Public Utility Commissioners of New Jersey has issued advance sheets of that part of the board's annual report which includes its recommendations. During the past year the board has approved issues of stocks, bonds and other securities in 59 cases, the par value of these issues amounting to \$88,106,750. The report gives an outline of the rules under which the commission acts in cases of this kind so as to avoid giving any approval which may be taken as a guarantee of either stocks or bonds to the investor. The number of complaints submitted to the board during the year was 606, and hearings have been held in 456 proceedings. The action of the commission has resulted in numerous reductions in freight rates, but most of these proceedings have been of an informal nature.

Plans have been made for the elimination of 30 grade crossings, and hearings have been held in 21 of these cases. The Pennsylvania during the past year has eliminated 13 grade crossings at Rahway, in connection with its extensive elevation of tracks through that place. The West Jersey & Seashore has begun work which will abolish 11 crossings in Camden. The Lackawanna has eliminated seven crossings in Chatham and is doing similar work in South Orange and other places which will cost nearly \$500,000. Ten crossings are to be abolished in Madison.

The board has ordered automatic bells at some crossings where the cost of maintaining an attendant was deemed unwarranted; and action has been taken looking to the erection of uniform signs at all crossings which are not attended by flagmen throughout the 24 hours. The Central of New Jersey has put in the hands of its crossing watchmen warning disks bearing the word "Stop" and reports satisfaction from their use. They have been obeyed without question by travelers on the highway. In a conference between the commission and different roads, with a view to making this plan universal throughout the state, opposition developed; though the board believes that the experience of the Central of New Jersey has answered all of the criticisms which were made by the other roads.

The board recommends the amendment of the law empowering it to fix rates, so as to clearly define the policy of the state as forbidding the commission to value the franchise of a utility in excess of the sum which has been legitimately spent in procuring it, and repeats a number of recommendations which were made to the last session of the legislature, but which were not adopted by that body.

### NEW HAMPSHIRE

The New Hampshire Public Service Commission has sent to the governor and the legislature its report for the two years ending August 31, 1914. The scope of the activities of the commission has greatly broadened during these two years, and the commissioners feel that this has been one of the most useful departments of the state government. They believe that if there should never again be a single reduction in the price of public service, the cost of the commission would be justified by the single item of the reduction in the price of gas in four principal cities; and in three of the four cases the reduction was accomplished by adjustment without any public hearing.



Of the 1,031 grade crossings in the state, 826 were unprotected when the commission took up the work of investigating them; and of these, 469 have been improved by cutting down trees and brush, 15 are to be protected by flagmen, 30 will have automatic gongs and lights, and 25 will be made safer by restricting the speed of trains. For the first time in the history of the state there has been a reasonably thorough inspection of steam and other power boats carrying passengers on inland waters.

The commission has recommended to town and city officers to erect uniform signs at the approaches to highway grade crossings, fixed at a standard distance from the track; and somewhat more than half of the towns in the state have adopted the recommendation and have ordered over 900 signs. Other towns have declined to take action, some of them because crossings are already protected by signs put up by a maker of automobile tires. The commission condemns these signs as being inadequate. The advertising matter obscures the words of warning. They are not at uniform distances and are placed at only a few crossings.

The commission reports its expenditures for the past year, and in connection with this statement gives some information received from other states most of which is summarized in the following table (the figures being, presumably, in each case for twelve months):

	Cost of State Commissions	No. of commis-sioners	Salaries of commis-sioners	Expendi-tures*	Total cost of department
New Hampshire.....	3	\$10,700	\$14,851	\$25,551	
California.....	5	40,000	270,066	310,066	
Connecticut.....	3	15,000	35,000	50,000	
Illinois.....	5	50,000	130,000	180,000	
Indiana.....	5	30,000	75,763	105,763	
Kansas.....	3	12,000	33,856	45,856	
Maine.....	3	14,000	44,000	58,000	
Maryland.....	3	16,000	58,995	74,995	
Massachusetts†.....	8	54,500	147,752	202,252	
Missouri.....	5	27,500	83,100	110,600	
Nebraska.....	3	9,000	40,920	49,920	
Nevada.....	3	11,500	20,863	32,363	
New Jersey.....	3	22,500	147,500	170,000	
New York (both dis-tricts).....	10	150,000	783,563	933,563	
Ohio.....	3	18,000	180,000	198,000	
Oklahoma.....	3	12,000	52,281	64,281	
Pennsylvania.....	7	70,000	.....	.....	
Rhode Island.....	3	11,000	8,000	19,000	
Vermont.....	3	5,600	12,700	18,300	
Washington.....	3	14,000	71,391	85,491	
Wisconsin.....	3	15,000	170,204	185,204	

\*Appropriations given when expenditures are not known.  
†Gas and Electric Light Commission included.

#### WESTERN MASSACHUSETTS TRANSPORTATION COMMISSION

The report of the Western Massachusetts Transportation Commission, L. C. Hyde, chairman, a special commission appointed by the governor last year, has submitted its report to the legislature of the state. A large part of the report is devoted to highways. That part which deals with railroads recommends the construction of a line from Williamsburg westward to Hinsdale, about 20 miles, the estimated cost of which would be \$1,200,000. This route is through a very hilly section, and traverses the center of the largest single region in the state which is not already supplied with railroad facilities. There are in the state 36 towns without either steam or electric transportation facilities; and 33 of these towns are in the five western counties, which is the territory dealt with in the report.

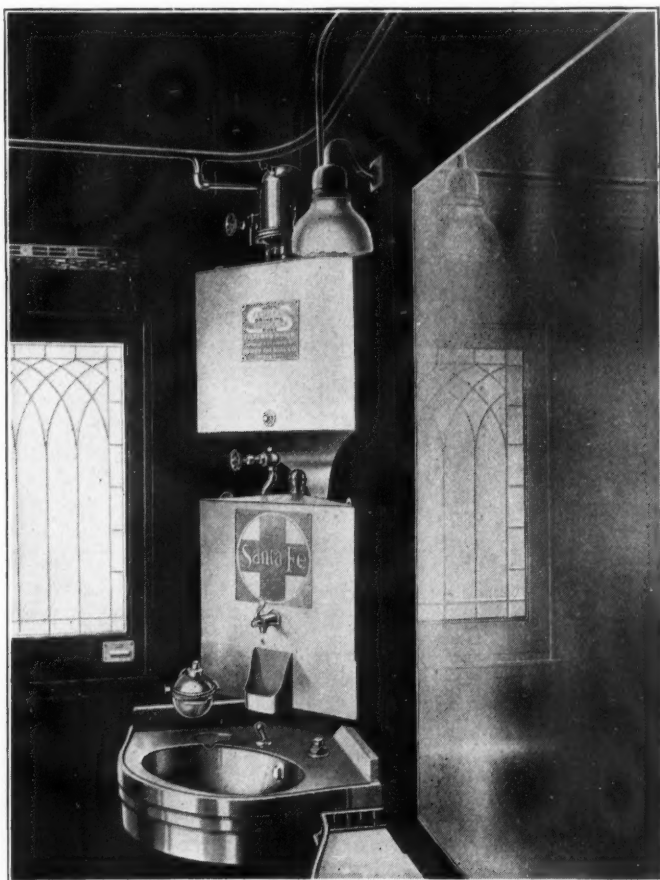
The commission recommends that the Public Service Commission be authorized to order the extension of street railways into adjoining towns which have no street railways; also to order street railways to carry freight and express. From Huntington westward to Lee, about 25 miles, there is an electric road, built last year and nearly finished; the commission asks that this road be required to begin operation by May 15.

**GERMAN CONTROLLED RAILWAYS.**—According to Amsterdam advices the Cologne papers state that seven Russian, nineteen Belgian and three French railway lines are now managed by German railway boards.

#### SANITARY DRINKING FOUNTAIN

A new type of drinking fountain which provides filtered water for passenger cars has been developed by Henry Giessel & Co., Chicago, and has given good service on one of the western roads. It is known as the "North Pole" sanitary drinking fountain, and consists of a filter, a storage tank for the filtered water, a cooling pan and an ice box. The fountain occupies a space 14 in. by 17 in. by 48 in., and all parts are accessible for inspection. Water from an overhead tank flows to the filter at the top of the fountain and is filtered through Tripoli rock, passing to the storage tank directly below. From this tank it passes to the cooling pan in the ice box, which is a water-tight vessel of small capacity. The ice surrounding the cooling pan lowers the temperature of the drinking water to a desirable degree without permitting any of the ice water to become mixed with the drinking water.

The metals used in the construction of the fountain are non-corrosive. The filter case is made of galvanized malleable iron and heavy tinned sheet brass. The storage tank and cooler are



"North Pole" Sanitary Drinking Fountain for Passenger Cars

made of heavy galvanized iron sheets. The cooling pan is made of galvanized gray iron. All the pipes and fittings are also galvanized and the parts exposed to view are finished in German silver. The filter is in the shape of a cylinder with its core removed; the water seeps through from the outside to the inside and passes directly to the storage tank. The filter material does not absorb the impurities of the water, and may readily be cleaned by scrubbing in water with a stiff brush. It may easily be removed and cleaned in about five minutes and should be cleaned every few days.

The principal features of this drinking fountain are its sanitary characteristics and the cheap grade and small quantity of ice that may be used. Comparative tests made with it and an ordinary water cooler in passenger cars between Chicago and Kansas City showed a saving of 73.6 per cent in the amount of ice used and 80 per cent in the cost of the ice in favor of the

filtered water, the temperature of the drinking water averaging 49 deg. for the filtered water and 38 deg. for the ordinary water cooler. Less care is required in the maintenance of this cooler than of the ordinary cooler, a general cleaning being necessary only when the cars are shopped. Provision is made for draining the entire system when the car is not in use and not supplied with heat in the cold weather.

### STEEL FRAME TRUCK

The freight handling truck shown in the illustration has recently been developed by the Edwards Manufacturing Company, Cincinnati, Ohio. The frame is made from  $2\frac{1}{2}$  in. by  $2\frac{1}{2}$  in. by  $\frac{3}{16}$  in. angle bar, the two sides and top crossbar being formed in a continuous piece. The side bars are dropped at the axle boxes, which are small castings bolted to the frame. This forms an especially rigid construction by reducing the height of the axle boxes and the leverage on the bolts. The crossbars are of  $1\frac{1}{2}$  in. by  $1\frac{1}{2}$  in. by  $\frac{3}{16}$  in. T-section, and are riveted to the



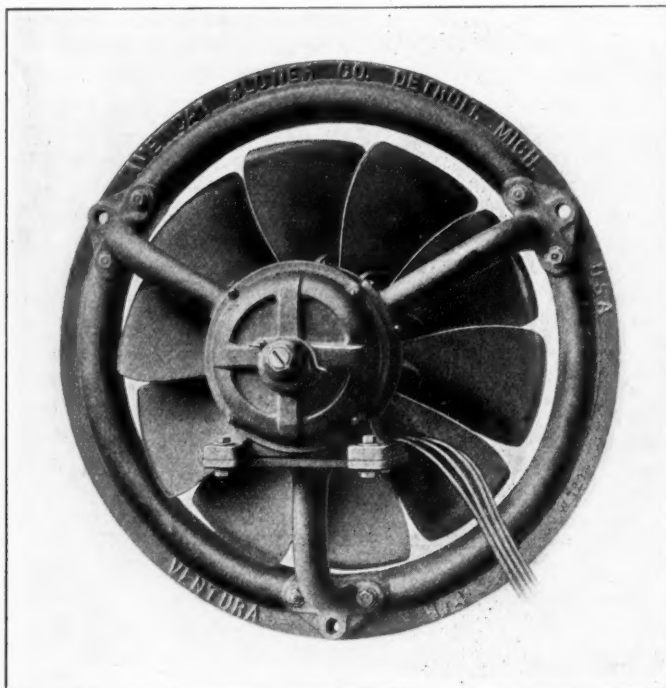
Freight Handling Truck with Structural Steel Frame

frame. The handles are of wood, reinforced with angle bars, and are readily detachable. Rivets are used in the construction throughout with the exception of the handles and axle bearings which are secured by bolts. The truck illustrated is designed for general purpose work, but the same construction is used in trucks of several other styles designed for handling special classes of freight.

**ELECTRIFICATION OF AN ITALIAN RAILWAY.**—Electric traction has just been introduced on the Turin & Savona Railway, for passenger traffic only, on the section of the line across the Apennines, between the latter town and Coval, a distance of 29 miles. This section, which is the heaviest part of the line, includes the Belbo tunnel, about 3 miles in length, with maximum gradients of 1 in 40. The maximum speed is 31 miles per hour. Savona, after Genoa and Venice, is the principal coal port in Italy; it is also an important manufacturing town, with large steel works.

### VENTILATING FAN

A type of ventilating fan which is claimed to be especially effective has recently been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The distinctive features are the wide central disk upon which the blades are mounted and the unusually large number of blades used. The ends of the blades are abruptly turned up causing the air to be thrown straight forward at a high velocity instead of being widely spread out, and the design of the



Ventilating Fan with Center Designed to Prevent Back Flow

fan at the center prevents a back flow of air at this point which often takes place with other designs.

The motor is specially designed for fan service. Being entirely enclosed it is protected from dust and moisture; it has a high overload capacity in order that no difficulty will be experienced in driving the fan against strong back pressure should it be located where affected by the wind. The motor is designed to run for long periods without attention and is claimed never to require more than an occasional inspection and lubrication. Power may be obtained from the electric light circuit.

**AN ENGLISH CLASSIFICATION SCHEME.**—The Machine Tool and Engineering Association, Ltd., of London, has issued an alphabetically arranged list showing the railway classification of freight primarily shipped by its members. The list is a summary of the General Railway Classification of Goods, and it contains some very useful information relating to the carriage of machinery, etc., by rail.

**TECHNICAL SCHOOLS IN THE UNITED STATES NAVY.**—Technical schools maintained by the navy, wherein instruction and training are given in trades that are useful both in the service and in civil life, include the following: The machinists' school at Charleston, S. C., in which men are fitted for the duties of machinists, ashore and afloat; the electricians' (radio and general) schools at New York and Mare Island (graduates of these institutions are ready to perform the many duties that fall to the lot of those charged with the care of the dynamos and radio plants used in the service); the artificers' school at Norfolk, which gives instruction and training in carpentry, blacksmithing, painting, plumbing and shipfitting.—*American Machinist.*



# Maintenance of Way Section

It is the experience of practically all associations that it is difficult to secure concise but complete committee reports. A committee will frequently go at length into the discussion of one phase of a subject to the neglect of other equally important phases. While this may be permissible, or even advisable when the committee is

## Efficient Committee Work

to be continued for several years, most committees exist for only one year. One cause for the defect in reports referred to is the improper selection and wording of the subjects assigned. Officers are prone to choose topics which are too broad to be covered in the work of a single year or are not sufficiently specific to indicate to the committees the scope and limits of their investigations. This is very likely, especially with inexperienced committeemen to result in the preparation of incomplete reports. The first step in the preparation of a committee report is the proper selection of a subject.

While not primarily a railroad organization, the American Wood Preservers' Association bears an important relation to the railways, as they are the largest users of treated timber. Its proceedings are therefore receiving more attention from railroad officers from year to year. This association is somewhat unusual, in that

## The American Wood Preservers' Association

its membership is composed very largely of two groups of men, those in charge of commercial treating plants whose largest customers are the railroads, and those connected with the operation of plants owned directly by the roads. As a result the commercial operators are meeting with railway men who include their principal customers and competitors. Considering the narrowness of the field few associations have made as great a growth in membership or in the strength of programs presented as has this one in the 13 years of its existence. The wide range of subjects in its field covered by it is indicated by the program for its convention this week at which papers were presented by the engineers connected with commercial and with railway treating plants, consulting timber engineers, government experimental officers, a professor of pharmacology and efficiency experts. The association occupies a special field in railway maintenance of way work for, with the continually expanding uses of treated timber and the changing conditions in methods of preservation, there is a growing demand for expert knowledge on this subject.

While there has been a great deal of independent study regarding the adaptability of various woods for treatment, the most practical methods of seasoning timber and the relative merits of the different timber treating processes for use in various parts of the country, there has been little concerted study of any extensive nature

## Standardization of Timber Treating

by any representative group of men, with the result that there is a wide diversity of practice and much money has been expended unwisely for timber treatment. This problem has been accentuated by conditions existing within the industry. The advocates of the different processes have in some cases urged the merits of their respective methods unwisely, while numerous commercial plants have been committed to certain processes to the exclusion of others which were better adapted to the needs of some of their clients. The American Railway Engineering Association and the American Wood Preservers' Association have endeavored to assemble the results of these different studies and to collect further information to determine the merits of

disputed points from the standpoint of the user. While only a start, the report of the committee of the American Wood Preservers' Association on Specifications for the Purchase and Preservation of Treatable Timber presented at the convention this week contain much valuable data regarding the merits of the different timbers and processes of treatment for varying local conditions of climate and service. Such information is of direct value to the railroad engineer endeavoring to determine the relative adaptability of different timbers and methods of treatment for local conditions which he has to meet. The work of this committee should therefore become of increasing importance and value as it is continued from year to year.

One of the broadest fields for the exercise of engineering ability lies in the working out of economical and expeditious plans for the handling of bridge work. Every problem has characteristics of its own which influence the selection of the best method. In renewing a span, the character and depth of the stream, the prevalence of floods, the design of the structure, the density and distribution of the traffic and the amount and kind of construction equipment available are among the conditions which must be considered. Variations in these conditions make numerous methods possible. We publish two interesting descriptions of bridge work elsewhere in this issue, which, while perhaps local in their application and possibly not even unique, are examples of methods of general interest. Many other ways of handling various problems involved in the construction, maintenance or reconstruction of bridges, including the renewal or strengthening of spans, the building, rebuilding, strengthening or protection of piers, etc., are of equal or greater interest. It is our desire to publish descriptions of the manner in which problems of this nature have been handled. We therefore announce a contest on "Bridge Construction Methods" to cover descriptions of methods not generally used or known for handling any feature of bridge construction, maintenance or reconstruction work on steel, concrete, or masonry bridges, including substructures. Contributions should describe in detail the methods employed and be accompanied by sketches or photographs to make the operations clear to the reader. We will pay \$25 for the best and \$15 for the second best articles contributed, the awards being based on the practical value and originality of the methods adopted. All contributions should be sent to the Engineering Editor, *Railway Age Gazette*, 608 South Dearborn street, Chicago, and must be received not later than March 10.

## Contest on Bridge Construction Methods

## THE EFFECT OF HEAVY WHEEL LOADS ON TRACK

A FEW years ago locomotives with wheel loads of 30,000 lb. would have been considered impracticable, but today they are used in considerable numbers and the indications are that they will meet with increasing favor. Their adoption brings up a question of live interest to the maintenance of way department, especially since these locomotives are designed to operate at as high speeds as those they have replaced. The problem may be further complicated by the introduction of heavier cars, such as the 90-ton cars of the Norfolk & Western, with wheel loads of 21,950 lb., and the 70-ton cars of the Chesapeake & Ohio, with wheel loads of 26,310 lb. None of this equipment has been in service long enough for the full effects on the track to be evident.

Many men now believe that we have gone beyond the reasonably safe limit of wheel loads with present-day track construction.

tion, while others are of the opinion that these increased loads need cause no concern on a properly maintained track. Viewing the problem from another angle, there is a wide difference of opinion between those who believe that the saving resulting from the reduced cost of transportation will be more than offset by the increased cost of maintenance of the track and structures; and those who believe that, while the cost of maintenance will necessarily increase somewhat, it will consume but a small proportion of the reduction in operating costs.

The question of safety requires careful consideration. Our accident statistics show a condition far from favorable, which is not exhibiting a tendency to improve. At the same time, it is doubtful if there is any cause for alarm on properly maintained tracks, and only such tracks should be considered in the discussion of this question, for if the tracks are not properly maintained, the error lies in the installation of these heavy locomotives. From the standpoint of ultimate economy it is evident that any increased service required of the track will necessitate increased expenditures. However, it is difficult to see how on properly constructed and maintained track, these expenditures should show any marked inclination to rise. In fact, on the Norfolk & Western, where heavy locomotives and the 90-ton cars have been operated in solid trains, the track has not been observed to require any unusual increase in cost of maintenance. There is a distinct need for the collection of accurate data showing the relation between increased wheel loads and maintenance of way expenditures. Such data would be of great value to a road considering the advisability of purchasing heavier locomotive and equipment.

#### ORGANIZATION FOR EMERGENCIES

**R**AILWAY work is largely associated with the heroic in the popular mind and many stories have been built about the methods by which various emergencies have been met. In no department do such special conditions arise more frequently, or require more radical treatment than in the maintenance of way department. When a line is washed out, all other work must be sacrificed for that of getting the destroyed line back into service. Material must be secured with seeming indifference to cost and every measure taken to restore the tracks and bridges to a condition for operation.

No better examples of this nature can be offered than the records of the forces participating in the reconstruction of the roads involved in the floods in Ohio and Indiana in 1913. In view of the magnitude of the destruction, the manner in which these unusual and extreme conditions were met by the roads involved and the rapidity with which the lines were returned to service were highly creditable to the organizations of those roads. Almost equally severe conditions are created by heavy snow storms. Men and equipment must be concentrated in the blockaded area and every effort be exerted to reopen the lines, entirely disregarding hours of service and physical comfort. Although generally less serious because of the possibility of detouring traffic over other lines, wrecks require similar concentration of all energies of the maintenance forces to the clearing of the line and in a smaller way call for the same thorough organization and knowledge of the work.

While any or all of these conditions are not met with every day, they do develop with sufficient frequency to form a part of the regular routine of railway operation which must be expected at any time. Therefore, the maintenance of way forces must be so organized that they will respond to any such emergency without delay or confusion and work with the greatest efficiency, for an hour saved under these conditions is worth several hours at any other time. The maintenance of way forces of the Long Island are so organized that every man from the engineer maintenance of way down to the signal maintainer or track laborer knows where he is to go and what he is to do at the approach of every winter storm. A gang foreman of the Pennsylvania has so organized his men that none of them leaves the headquarters when off duty without reporting to him, so that they can be reached immediately if needed. These organ-

izations are typical of those existing at many other points, although they are by no means universal or even common.

Of equal importance with thorough organization in the meeting of emergencies is the proper maintenance of the necessary equipment fully fitted with tools and other necessary supplies at all times at certain definite and well established points. The unusually severe snow storms in western Kansas two years ago found a number of the roads with snow fighting equipment in bad repair or incompletely fitted with tools and other supplies, with the result that entirely unnecessary and serious delays followed in the opening of these lines to service. It would seem evident that if the dangers of blockades are sufficiently important to justify the purchase of equipment they are also of sufficient importance to cause the equipment to be kept in the best possible condition, even though it may not be needed for several years at a time.

The results of a thorough organization of forces and equipment for emergencies are not confined to the handling of such work, but are reflected as well in the conduct of the ordinary routine duties. It may be argued that it is difficult to organize maintenance of way forces to such a degree, and it must be admitted that this is a serious problem. At the same time the fact that such organizations have been perfected with the average class of employees shows that it is possible. Also, such organizations are not confined to any one road or group of roads, but are to be found on different divisions on many roads, indicating that they result largely from the attention given to this subject by the supervising and local officers. The roadmaster or supervisor who feels that he cannot take the necessary time from the details of signing payrolls and requests for transportation is overlooking one of his most important duties, for the thorough organization of his forces will aid materially in developing a class of foremen who will require less attention on his part, giving him more time for the larger problems.

#### NEW BOOKS

*Preservation of Structural Timber.* By Howard F. Weiss, director, Forest Products Laboratory, United States Forest Service. Size 6 in. by 9 in., 312 pages, illustrated by 23 plates, 32 figures and 43 tables. Bound in cloth. Published by the McGraw-Hill Book Company, New York City. Price \$3.

The "Preservation of Structural Timber" will doubtless receive special attention from railway men and those engaged in other industries using large quantities of timber since it represents the first attempt to discuss this increasingly important subject in a comprehensive manner. In connection with his work in the Forest Products Laboratory, the author has had an excellent opportunity to come in touch with all phases of the wood preserving industry. While a great deal of the material is original discussion, the book includes a large amount of data previously published in technical journals and society proceedings which are here conveniently grouped for reference. The book is designed for use as a text as well as a reference book and the fact that it is compiled in large part from notes used in a lecture course given to students in civil engineering at the University of Wisconsin, shows that it can readily be adapted to instructional work. A complete enumeration of the chapter headings would include many subjects of direct interest to railway men, among which are the following: Factors Which Cause the Deterioration of Structural Timber; The Effect of the Structure of Wood Upon Its Injection with Preservatives; The Preparation of Timber for Preservative Treatment; Processes Used in Protecting Wood from Decay; Preservatives Used in Protecting Wood from Decay; The Construction and Operation of Wood Preserving Plants; Prolonging the Life of Crossties from Decay and Abrasion; The Protection of Timber from Fire; The Strength and Electrolysis of Treated Timber, and The Use of Substitutes for Treated Timber. In addition, the appendices include references to the minor wood preserving processes and the patented and proprietary preservatives, lists of the manufacturers of zinc chloride and of creosote.



## Letters to the Editor

## A CROSSING OF STANDARD AND NARROW GAGE TRACKS

PERRYVILLE. Md.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

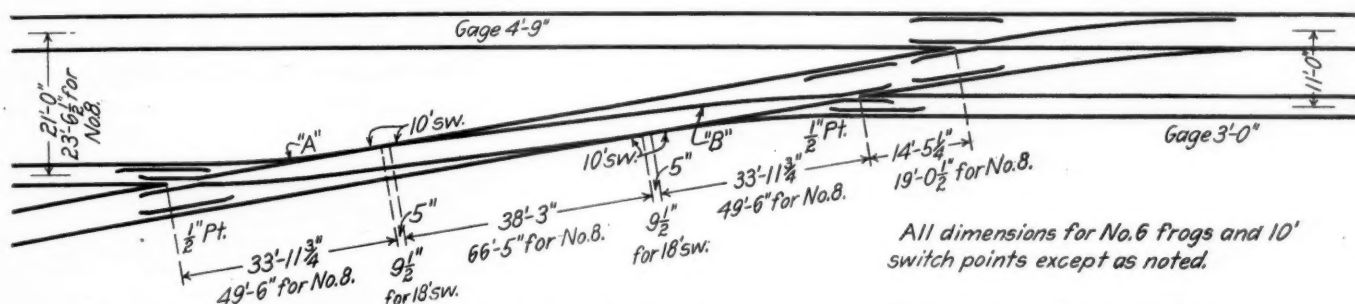
Without detracting from the utility of the ingenious scheme developed by T. C. Herbert and described in the *Railway Age Gazette* of December 18, I would suggest that the spacing of the switch points 5 ft. apart does not give the best alinement possible. These points take the place of movable point frogs and manifestly should not be farther apart than twice the distance of the actual from the theoretical point of switch. The smoothest curve will be secured by establishing a tangent line between the heel of the end switches, or, if preferred, between the points where the planing of the switch points terminates. This line will be fixed by the switch angle, and the distance heel to heel shown as A B on the accompanying sketch will be equal to the difference between the two

a man could be with 25 miles. In a gang of 20 men there is more chance for dissatisfaction and a greater tendency to create disturbances of various kinds. The large amount of traveling to and from the work on a 25-mile territory on motor cars with 20 men adds to the chances for personal injuries. The larger the gang, regardless of the supervision, the greater are the chances for the men to shirk their work. If the physical condition of the line requires it, an extra gang with boarding cars may be moved about to handle heavy ballasting or to renew ties, etc., on any particular section, the number of men in the gang being governed by the amount of extra work in sight.

From an economical standpoint I believe the small gang is the better for all purposes.

## ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since December 18, 1914:



### Dimensions for the Best Arrangement of a Narrow Gage and a Standard Gage Crossing Using No. 6 and No. 8 Frogs

gages plus twice the heel distances, divided by the tangent of the switch angle. The sketch shows the dimensions as worked out for No. 6 frogs with 10-ft. switch points and for No. 8 frogs with 18-ft. points on the above basis.

## ORGANIZATION FOR TRACK MAINTENANCE

HAILEYVILLE, Okla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

It occurs to the writer that the ground was not entirely covered in the article in the *Railway Age Gazette* of December 18, entitled "A Suggested Organization for Track Maintenance." There are many other things to be taken into consideration which will work against the economy of such a gang. The time lost in going to and from the work each day, by 20 men on a 25-mile territory, will more than offset the increased supervision on a 6-mile section, even if motor cars are used. Also, the efficiency of the gang will be reduced, since a foreman and an assistant foreman with 25 men will not secure as much work per man as a foreman with 6 men, as they are unable to devote as much time to the supervision of each man. Again, in case of accident, there will be a greater delay at times in locating and securing the assistance of a large gang, which might be 25 miles away, while a small gang could not be more than 6 miles distant. There is also a great deal of other work which is taken care of by section men, such as transferring bad-order cars at stations, unloading fuel, loading cotton, bedding stock cars, etc. Under the large gang system the greater part of the gang would have to be employed on other work, possibly 15 miles away, as only a few men are required for such work.

A foreman with six men and six miles of dirt track will be able to maintain his section in first class shape during the open season, do the odd jobs of station repairs, and keep up right of way fences, farm gates, etc. When the work has been advanced to the proper point, or when bad weather sets in, the gang may be reduced and the foreman will still be in charge of a territory with which he is more familiar than

**Apportioning Grade Separation Cost.**—An editorial commenting on the tendency of state commissions to apportion grade separation costs more equitably between the railways and the municipality benefiting from the work was published in the issue of December 25, page 1167.

**Methods of Handling L. C. L. Outbound Freight.**—A discussion of the relative merits of two-wheel, four-wheel and motor trucks including cost data gathered in an exhaustive study of this subject by E. H. Lee, vice-president and chief engineer, Chicago & Western Indiana, was abstracted on page 1181 of the issue of December 25, from a bulletin of the American Railway Engineering Association.

**Pennsylvania Coal Docks at Sandusky.**—The design and methods of construction of a new dock and coal handling machine for loading coal on lake vessels were described and illustrated in the issue of December 25, page 1189.

The Influence of Carbon on the Properties of Rails.—The effects of varying carbon contents on the physical properties of rails was made the subject of an investigation by the Rail committee of the American Railway Engineering Association and the result was published as an appendix to the report of that committee. An abstract of this report was published in the issue of December 25, page 1196.

Railway Construction in 1914.—The annual statement of new mileage reported built during 1914 showed a startling decrease, this figure being less than for any year since 1895 and less than one-half of the amount built in each of the three preceding years. The details of the new mileage completed in 1914 with a summary of the construction figures for each year since 1893 were published in the issue of January 1, page 23. An editorial commenting on these figures and the general tendency in construction was published in the same issue, page 3.

**Instructions for Federal Valuation.**—An abstract of the second tentative draft of instructions for the guidance of roadway and track parties engaged in the valuation of railway property recently issued by the Interstate Commerce Commission was published in the issue of January 8, page 62. An editorial commenting on the amount of detail required in this work and raising the question whether in some cases the records already kept by the carriers would not suffice, was published in the same issue, page 44.

New Chicago & Alton Shops at Bloomington, Ill.—An illustrated description of the new locomotive shops, blacksmith shops and storehouse recently completed by the Alton as an enlargement to its Bloomington shops was published in the issue of January 8, page 49.

St. Paul and Oregon-Washington Joint Terminals in Spokane.—The Chicago, Milwaukee & St. Paul and the Oregon-Washington Railroad & Navigation Company have recently completed a joint terminal in Spokane in connection with which new entrances to the city were built by both roads, involving heavy grade separation work. An illustrated description of the grade separation problems on the Milwaukee entrance was published in the issue of January 15, page 85.

# Methods of Handling Snow on Northern Roads

## Discussions of Precautions to Be Taken in Fall and Ways to Keep Tracks Open During Winter Storms

On account of the importance and the present timely interest to railway men of the subject of handling snow and ice to keep the tracks open during the winter, we publish below three discussions of the various phases of this problem by men experienced in this work. Mr. Lewis has been actively engaged in maintenance work in the northern part of the United States for the last 10 years, being division engineer of the Michigan Central at Bay City, Mich., for six years and assistant to the general manager of the Duluth, South Shore & Atlantic in charge of maintenance for the last three years. On both of these lines snow fighting is a serious problem. Mr. Whitney is roadmaster on the Canadian Pacific at Medicine Hat, Alta., a point suggesting bad weather in the mind of the average man. Mr. Clough is a supervisor of track on the four-track main line of the New York Central & Hudson River in northern New York, a locality noted for the number and severity of its winter storms.

### THE WINTER'S CAMPAIGN

By E. R. LEWIS

Assistant to General Manager, Duluth, South Shore & Atlantic,  
Duluth, Minn.

In localities where frost is little known, track work is a continuous performance with only the wet season to interfere with the excellent results obtainable, insofar as weather is concerned. Railways in colder climates are not so favored. There is no doubt that winter will bring to them snow and ice in plenty. The long snow campaign is a foregone conclusion and it is anticipated, prepared for and fought to a finish. In localities further south there is the gambler's chance of getting through the winter without a snow fight. There is the tendency after a mild season or two, to neglect organization and equipment, to forget to repair tools, to fail to buy what is needed to fight snow; with sooner or later the inevitable costly result of hiring large, untrained emergency forces, of trains stalled and tracks blockaded, of damage to perishable freight and loss of connections, of congested yards and the wide-spread chaos which it takes so long to wholly overcome.

### PRECAUTIONS

Preparations for the winter's snow fight should be made in advance. Thorough organization and rigid discipline enter very largely into the successful program. A preliminary early autumn meeting of all the officers concerned, at which a program is discussed and definitely detailed, is of primary value. Standards of equipment and tools needed in the work may then be definitely adopted. Each officer and man should understand exactly where he is expected to be, and when, and what tools are to be in his direct charge. He should know what he is expected to do in every emergency. To this end meetings of supervisors and their subordinates may be held before snow falls, when the orders necessary to carry out the officers' program are explained, and the employees and their foremen receive instructions in detail.

Equipment on hand should preferably be inspected and repaired in the early fall. After repairs have been made it should be re-inspected and tested by the men who are to actually use it. Small tools and spare parts should be given in direct charge of the employees who will be concerned in their use. Experience has proven that spare tools put into a snow plow in summer get away before winter, that fuel and cylinder oil, bell cord and wood alcohol are better kept in the roadmaster's locker than in a Russell plow until winter comes. Experience has also proven that flanger shoes are not always set at exactly the right height and that air brake equipment is not always in order after disuse. Therefore tests are necessary preliminaries. The locations of

snow plows and flangers, not merely the stations, but the tracks where they are to be found, and the position of the plows on the tracks, should be prescribed. It is often of the utmost importance to know which way a plow is headed and whether it is first out on a certain siding.

Not only the track employees and officers need organizing, but the intelligent co-operation of the entire staff is necessary to the success of snow and ice handling. The heads of other departments should be organized so thoroughly and so early, that they may transmit to their subordinates uniform instructions for taking precautions against the common enemy in advance of the campaign. Every division engineer and supervisor in charge of snowy territory should be required to make minute inquiry into the matter of tools and equipment for snow and ice handling, and to present, as a result of his investigations, his recommendations of the most suitable types for use.

Quantity is as important as quality in the matter of tools and equipment. That which is on hand should be put in the best condition early. Sections should be supplied with suitable substitutes for worn-out tools returned. Additional tools of proper quality should be requisitioned at such time and in such quantity as will insure that at the beginning of winter each foreman will have a reasonable supply and no more in first class condition for use. Someone should be detailed to examine each carhouse in turn, and to take account of quantities and conditions of tools. When resulting requisitions have been filled, a second inspection should be made to make sure all is in readiness, and especially that the condition of tools is as formerly ordered.

The tools and equipment used necessarily vary on railways in different localities, but some or all of the following equipment is used probably by all companies whose lines traverse territory subject to freezing temperatures: Flangers, pilot plows, push plows, snow crabs, rotary plows, levellers and spreaders. Tools and auxiliary equipment in common use include matched plank housing over locomotive tenders, tarpaulins for locomotive gangways, rubber coats for locomotive crews in snow service, hose attachment to steam dome and hose for clearing snow and ice from locomotive trucks and running gear; snow sheds, snow fence, track shims, rattan brooms with chisel end handles, salt, sand, hand car brooms and broom holders, spud bars, snow shovels, picks, mattocks, spades, lanterns and wood alcohol.

The proper setting of snow fence, both portable and permanent, is of importance and requires constant vigilance and periodical changes. Improperly placed snow fence may cause obstructions to traffic where no trouble would exist if the fence were removed. In early winter, before snow or frost comes, the snow fence should be placed to best advantage according to the experience of former years. It will probably be found necessary to remove the planks from farm and highway crossings to prevent heaving due to frost.

### EARLY WINTER OPERATIONS

In early winter, snow at first gives little or no trouble. If pilot plows or even Priest flangers are used on locomotives the rail may be kept clear during the first few storms. Trouble begins when there is no more room for new snow; when the tracks in places become grooves through deep snow banks; when the new, light snow drifts swiftly into rail flangeways and behind switch points. Then "winging back" becomes the order of the day. Oftentimes snow must be shoveled away from around switchstands and from about buildings located close to the track, to make room in advance of impending storms. Old snow packs hard and some of it turns to ice or is ice covered. The frequent use of flangers leaves a high ridge of unmoved snow in the track center. This becomes hard or freezes after a thaw



unless thoroughly removed by a snow plow. High center snow track is one of the dangers to be treated with great respect in early winter. If plowed out quickly no danger ensues. If neglected, anyone of several weather conditions may tie up the road. Winging back snow from the sides of the track before it becomes hard is quite as necessary.

After the snow drifts of early winter have formed in front of portable fence panels, the fence may be moved to a new position and made to do double duty, usually behind its first location. Stakes may be driven for fence anchors with the aid of frost bars, or the fence may be dug into the drifts. Tracks in yards, and at track and other tanks, should receive special attention on account of accumulations of ice due to locomotives dripping while taking water, and to locomotives and coaches dripping while switching in yards. Salt and sand play an important part in preserving the safety of persons about platforms and crossings. It is possible to construct a flat car snow plow flanger strong enough and weight it down sufficiently to nose ice from frozen track centers. Such a flanger should, of course, have extra heavy steel shoes which should be raised and lowered by means of air, and should be very heavily weighted and skillfully manipulated.

#### MIDWINTER OPERATIONS

"As the days begin to lengthen" and "the cold begins to strengthen" the troubles of the snow fighter multiply. It is imperative that section forces get shims in the track to avoid slow orders. The sharpest lookout must be kept for broken rails. Snow accompanied by high wind fills switches and rail flanges faster than they can be cleared. It is well that permanent employees are seasoned to cold weather and out-of-doors work. Their number must be augmented by temporary forces of laborers when the long continued, severe midwinter storms strike. Then the battle is on in earnest. With shovel and pick, with salt and sand and broom, by day and by night, the struggle continues. In times of direst stress, freight trains are abandoned and all efforts directed to keeping the lines open to passenger traffic. Snow plows are run ahead of each train. Locomotives are double headed behind the big plows. Occasionally a rotary or a Russell plow has three or even four locomotives behind it. Between storms the struggle goes on in preparation for the next blizzard. Wherever a car stands idle it is snowed in. A string of flats becomes only a long snow bank in a few hours. When the storm subsides there is weary work with shovel and switch engine to get the cars out, preparatory to plowing the snow off the track. Here, as always, judgment counts. One or two or three cars at a time may be cleared and moved, when a longer string could not be handled.

Turntables now give trouble. The pits blow full of snow. This snow and that which drifts in between the table and roundhouse is ordinarily loaded on trains and thus removed from the yards. Some turntable pits are covered with planked decks which revolve with the tables, while stoves set half through the decks keep the pits warm and melt the snow. A better device is a concrete floored turntable pit into which water of condensation flows from the roundhouse steam plant. A steam pipe also furnishes exhaust steam to heat the water which flows into the pit to a level of a few inches below the center. When full of hot water, snow from the surrounding tracks is shovelled into the pit, melted and carried off through an overflow pipe to the sewer system. Success depends on having the pit full of hot water before any snow is added.

The small hose connected to the steam domes of freight locomotives may be used to thaw ice from water-tank spout connections as well as to clear the locomotive running gear of snow and ice. If snow plow wings are manipulated by air, efficiency is more than doubled over hand-worked wings. It is necessary to run fast to throw snow. Wings must be taken in and extended quickly when traveling at 40 to 50 miles an hour to avoid obstructions and to do the necessary work, without leaving long stretches of unmoved snow at grade crossings and passing tracks.

Clearing yards of snow is often best done with a leveller that

will push snow sidewise from track to track till all are finally cleared. It is, of course, necessary to clear at least two adjacent parallel tracks of all cars before such a process is started, and to proceed in the same manner, shifting cars to the cleaned tracks as each string is moved from the tracks yet to be cleaned of snow. The snow ridges between parallel tracks, if allowed to accumulate, soon become hard. Handling it onto cars by shovel and carrying it from the yard by train is often necessary and always expensive. When necessary to handle by train, the unloading should be done by plowing off a nearby bridge if possible.

#### LATE WINTER OPERATIONS

Shimming is usually continued during late winter, as everyday conditions alter the track level in places. Replacing snow fence is often imperative during the later months of winter. A second line of movable fence is sometimes placed on top of, or further from the tracks than the first line of fence, when the first fence has been completely drifted over. Brush and snow cakes are sometimes made to serve this purpose when additional panels of movable fence are not at hand. Hard snow in narrow cuts may most readily be plowed onto the track with the snow crab, from thence to be cleared from the cut with the rotary plow. Rotary plows are expensive machines. They are of value only in very heavy snow drifts. Therefore only those railways which have to combat the severest snow conditions are equipped with them. Blizzards are occasionally encountered which blow the snow so fiercely that a rotary plow must be quickly turned to avoid being snowed in itself.

#### SPRING OPERATIONS

The warm middays and the cold nights and mornings of early spring produce alternate thawing and freezing, which result in conditions peculiarly dangerous to track. Water from melting snow banks fills the rail flanges at midday and freezes solid over night. Drains dug to carry off snow water freeze, overflow and flood the space between the rails. Under extreme conditions many miles of track have been known to be under water at sundown and under a glare of solid ice next morning, with a resultant tie-up of traffic and extraordinary expense for pick and shovel work. Diligent winging back, spreading and draining of snow banks will prevent or minimize this danger. In early spring, track conditions alter hourly and demand more frequent track patrol and alterations of shims. The safe lowering and final removal of shims in spring is even more difficult than placing them in winter. Traffic should proceed with great caution, the engine and trainmen realizing that in an hour the weather may have a hundred miles of track, making it impossible to re-shim the whole length in any short space of time.

Thorough and prompt co-operation and utmost caution is necessary to carry a railway through a severe northern winter without serious accident. Railways exist primarily for the purpose of transporting persons and property from place to place safely and expeditiously. If climatic conditions so alter that it becomes unsafe to maintain in winter the speed of trains prescribed in summer schedules, the schedules should be changed. It is important to keep track in such condition that trains will be on time, but it is of vastly greater importance that trains be kept on the track. No person is so competent to judge of the safety of track as the maintenance officer and foreman. It is therefore the first duty of these men to know and to give warning of track conditions incompatible with safety to traffic under existing weather conditions and schedules.

#### THE SNOW PROBLEM AT ITS WORST

By H. O. WHITNEY

Roadmaster, Canadian Pacific, Medicine Hat, Alta.

In this part of the country where snow and wind combine to make trouble and expense for railroads we have learned from past experience to be prepared in time, and with this end in view snow fighting begins in September. An extra gang is started out repairing permanent snow fences and putting up portable

fences that have been removed in the spring to allow land to be cultivated. Each winter careful note is made of points where improvements can be effected by the building of additional fences or the relocation of old ones, these changes being made by the repair gangs. To avoid moving fences in the spring and fall and also to protect them from cattle, this company is buying additional right of way, moving the fences back and building permanent snow fences. This reduces maintenance charges for fence repairing and moving and allows the building of stronger fences, thereby not only affording better protection, but also improving the appearance of the right of way. A few years ago tree-planting for snow protection was started. This will in time be a great assistance, although not entirely taking the place of snow fences.

During the summer, snow plows, flangers, ice cutters, etc., are overhauled in the shops and by September are in their assigned stations, spotted on spurs of their own where they will be easily accessible when needed. As this is considered a bad district for snow trouble, not so much for the depth of snowfall as for the wind that accompanies it, we have three snow plows, besides flangers and spreaders, one at each end of the sub-division and one at an intermediate point. All new plows are of solid steel, operating both wings and nose points by air, and are equipped with electric headlights. I equipped each plow with a set of tools, lanterns, two mattresses and blankets. I also have a chart made and framed which is hung in front of the man operating the plow which shows all crossings, bridges and other obstacles which fail to clear wings or flanges. At points where the plows are stored, an experienced section foreman is stationed who is familiar with the district. He is sent over the road on the locomotive of a passenger train to refresh his knowledge of all obstacles and to note any new ones.

At the first signs of snow all private crossings that are not used during the winter months are taken up. As a rule no regular extra gangs are kept on this district during the winter months. However, to be prepared for any emergency we have a set of boarding cars and tools fitted up ready to take care of men at a minute's notice. These cars are the best of our boarding equipment, the bunk cars being sheeted and floored and containing stoves, good bunks and other necessary fixtures. Cook, dining and store cars are also fitted up for winter service.

Experience has taught us the value of snow fences, and with this in view we try not to allow them to become filled with snow. When this condition occurs, the line of portable fence is moved back. This can generally be done with section crews, but if necessity demands, an extra gang is put at this work. Snow walls can be built if conditions become acute, but where possible it pays to move back fences. This will mean a saving in expense for running the snow plow, and the longer this can be put off the better. Running the plow when not absolutely necessary should be discouraged, as it will form snow cuts and increase the number of places needing protection. Snow plows should always be run with the wings opened to prevent making a trough which each succeeding storm renders more difficult to widen. When snow cuts begin to gain such a height that it is difficult to operate a plow they should be widened out. There are several methods of doing this work. One of the cheapest is to run a drag through the cuts. This drag operates by air at the rear of a car and throws the snow into the center of the track, the rotary then following to throw it out. This operation is repeated until the cut is the desired width.

Clearing out snow and ice in yards and terminals makes a large item of expense. Mechanical means of late have been employed and labor charges reduced to a great extent. At two of our terminals, natural gas is used to clean switches and the cost is reduced thereby to a minimum. It has been found that a flame from crude oil and residue of Pintsch gas with a blower is economical and satisfactory for cleaning snow from interlocking plants and switches. Salt is supplied and in the larger terminals ice cutters are also furnished. Spreaders are used for cleaning tracks of snow and it has become the exception rather than the rule to use labor for these purposes.

## IMPORTANCE OF ORGANIZATION IN FIGHTING SNOW

By A. M. CLOUGH

Supervisor of Track, New York Central & Hudson River, Batavia, N. Y.

Although conditions in different parts of the country no doubt have something to do with the different methods of handling snow on various railroads, the preparations should be the same whatever method is used. Our first care is to see that plenty of good equipment is provided, that it is thoroughly repaired and tested, and placed at required points and on tracks so as to be easily available at any moment. The repairing and testing are done at the division car shops, where equipment is all assembled during the summer months, but in addition to the car department men testing it, a representative of the maintenance of way department oversees the repairs and tests, and again after it is returned to the supervisor's headquarters it is tested by a work train crew to make doubly sure that it is in perfect condition. This refers to snow plows with wings and flangers, rotary plows, flangers, cars and roadbed spreaders—all equipment used with power for handling snow.

We organize the men who are competent to handle the different equipment with special reference to their knowledge of the territory they are to run over, sending these men over the different lines to familiarize themselves with the different marks and obstructions before the winter sets in. We also have a thorough understanding with the division superintendent's office and dispatchers in regard to furnishing locomotives and crews with the least possible delay when called upon to man our snow fighting equipment.

Our next care is to see that all obstructions to flangers—such as crossing plank, temporary guard rails, or anything not needed between the rails—are removed during the winter months and to properly mark all places that would interfere with the operation of flangers or the wings of snow plows. These marks are specially designed targets, made of wood, painted black and white and placed in permanent metal sockets where needed or placed for the winter and removed in the spring.

We then prepare for emergency where men are needed for handling snow either by keeping a foreman and a small force of men at division headquarters as a nucleus of a larger force when needed, or by having a foreman who knows where to find men when wanted. The necessary tools and boarding cars are provided to take care of laborers and provisions made for feeding them when working long hours away from home. In this way a very heavy storm can be handled promptly and economically.

As the switches and the signaling apparatus are the most vital parts of a railroad, it is always to those that the regular track forces give their immediate attention at the first sign of a storm, being reinforced by a number of extra men at times. Formerly, when switches were operated on the ground by hand, one man, sometimes the switch tender, could care for a number of switches, cleaning them as they were needed for train movements, but this is entirely changed by the advent of the central control of switches from a tower, either by hand or power, so that it now requires a man at nearly every switch to keep them clean at all times. This is a most important part of handling a severe storm, as the free and uninterrupted movement of trains from one track to another at interlocking plants helps materially to prevent trains from having to stop at block signals in outlying cuts, where they might be stalled and would have to be dug out.

The use of hydro-carbon is gradually coming into favor in large terminals for melting the snow around slip switches and large layouts, and is now being very successfully used on our lines, but the old method of the snow shovel and broom is still most widely used. It is a very essential duty of foremen in charge of men to choose the very best men to do this work and to protect them while doing it. Apart from cautioning them to look out for train or locomotive movements, a foreman should, if possible, have other men working close to the actual switch cleaners to call to them to get out of the way.

The hardest part of the fight with any snowstorm is to dig



trains out that have become stalled. The snow plow with a good force of men should be run as close up to the stalled train as possible, the men should be unloaded to commence digging out the train and the snow plow taken back to the nearest spur track. When the snow plow crew returns, a portion of the train will be ready to be pulled out of the snow. The cars released should be drawn to the nearest siding and the operation repeated until the whole train is released. The men should shovel out the snow in such cuts until the banks are sufficiently widened so that the wing of the snow plow will have full play.

Immense benefits can be secured by properly placing snow fences at troublesome cuts where snow drifts badly, and a small sum for the privilege of placing portable snow fence 50 ft. or more from the top of the cut on adjacent property will pay for itself many times over during a severe winter.

In the dead of winter when storms follow each other closely, the snow which has accumulated in large quantities in yards should be hauled away immediately, all drains opened up and everything made ready for another storm. Sometimes it looks unnecessary when the weather is mild and the sun shining, but to be prepared is half the battle.

### AN INTERESTING PIER PROTECTION PROBLEM

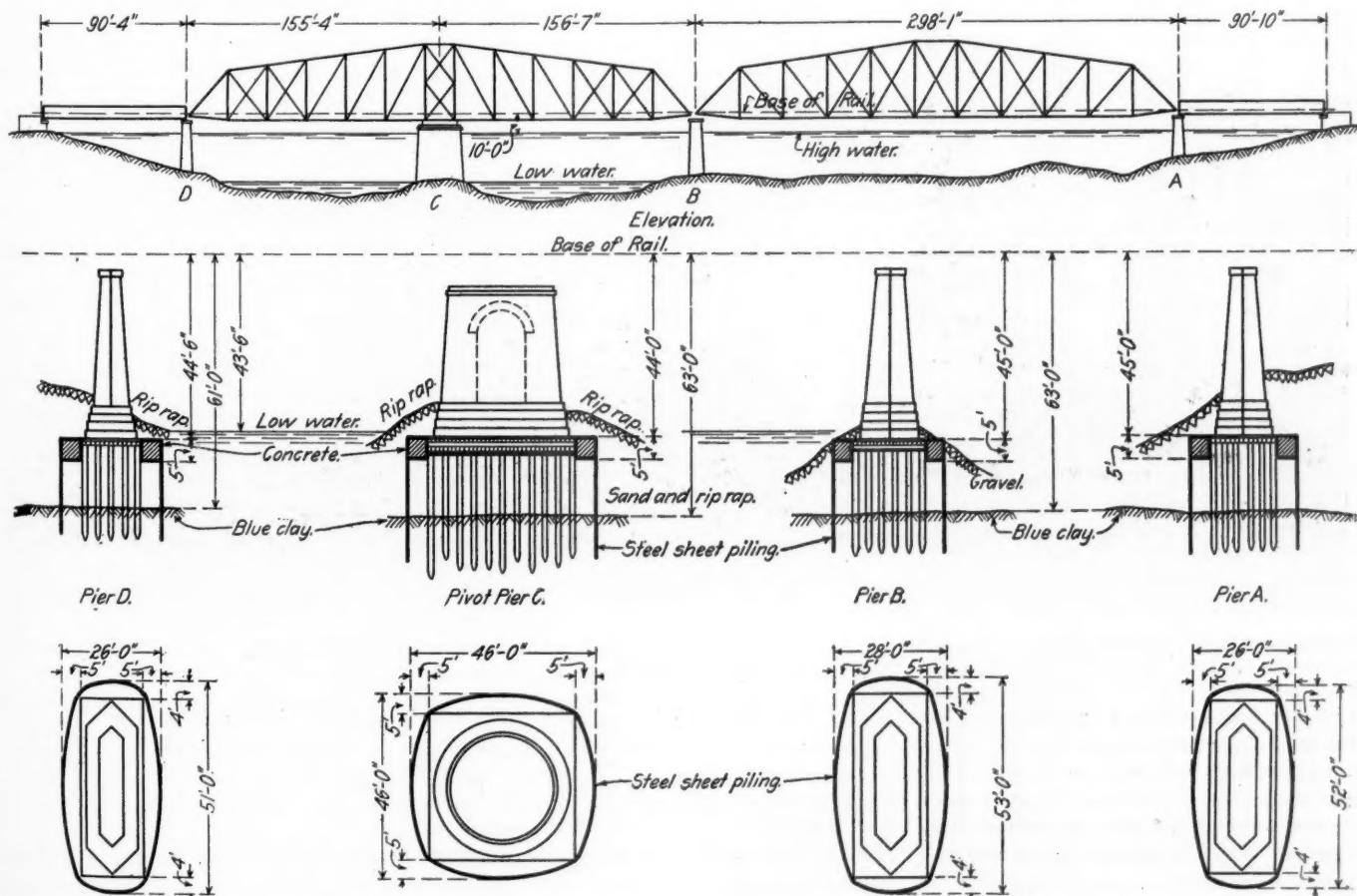
The St. Louis, Iron Mountain & Southern has just completed the protection of the bridge piers at its crossing of the Red river at Fulton, Ark., which involved several features of special interest. This bridge consists of a swing span 311 ft. 11 in. long, a through truss span 298 ft. 1 in. long and two 90-ft. approach girder spans. The piers are of masonry supported on timber grillages on piles, and, although the superstructure has been replaced once since the construction of the bridge about 1879, the piers are still in excellent condition to carry any load which may be placed on them for some time to come. The bed of the river at this point is of alluvial material which scours easily. Within the past two or three years levees have been constructed on both sides of the stream, reducing the flood channel from 10

or 12 miles in width to about  $1\frac{1}{2}$  miles, and as a result the river now scours badly. While this condition has not endangered the piers up to the present time, it has been owing to the absence of high floods since the construction of the levees. However, such floods may be expected at any time and trouble might result.

To eliminate any danger of failure of the bridge through the scouring of the foundations a caisson of steel sheet piling was driven entirely around each pier, as shown in the drawing, the caisson being sealed to the grillage with a 5 ft. layer of concrete. In the construction the piling was first assembled and completely interlocked before driving. It was then driven one or two feet at a time, the hammer moving from pile to pile around the pier. When the piles had been driven some distance into the bed of the river, but while the tops were still above water forming a cofferdam about the pier, the interior was pumped out, riprap and other material excavated 5 ft. below the top of the grillage and a 5-ft. layer of concrete placed with tar paper between it and the piling. Any sand which ran out of the grillage was also replaced with concrete, but no attempt was made to force concrete into the grillage or to strengthen it as it had ample support. After this concrete had set properly, the piling was driven down to its final position, extending several feet into a hard, blue clay.

After the piling had been driven to place for the two shore piers light puddle cofferdams were erected around the walls, the water was pumped out and the piling was cut off with a Blau-gas flame. Because of the increased depth of water a light timber cofferdam was erected at the center pier, and at the pivot pier, which was driven last, the piling was cut off, before driving, to the desired length as determined by information secured in driving the caissons at the other piers.

Thirty-five pound Lackawanna and United States steel sheet piling was used. The driving was started with a drop hammer which was replaced with a No. 2 Vulcan steam hammer as soon as sufficient room was secured. This work was done under contract by the Kansas City Bridge Company, Kansas City, Mo., under the direction of C. E. Smith, chief engineer, Missouri Pacific System, and F. L. Wonson, bridge engineer.



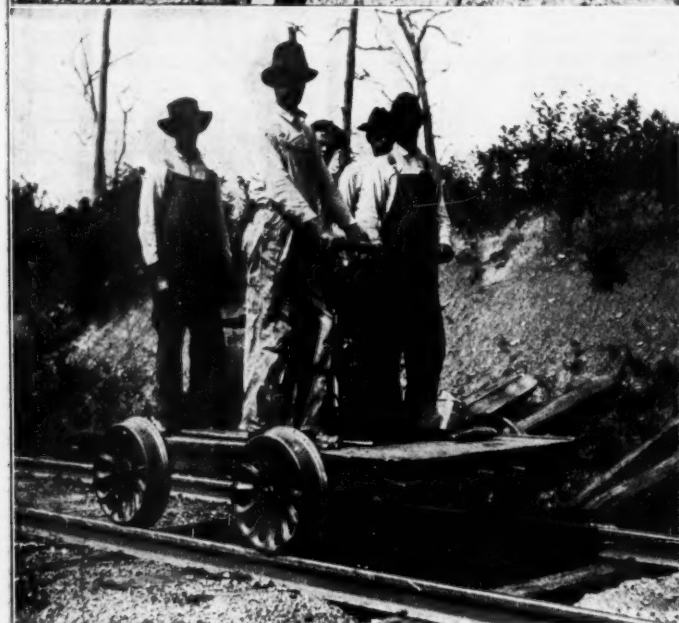
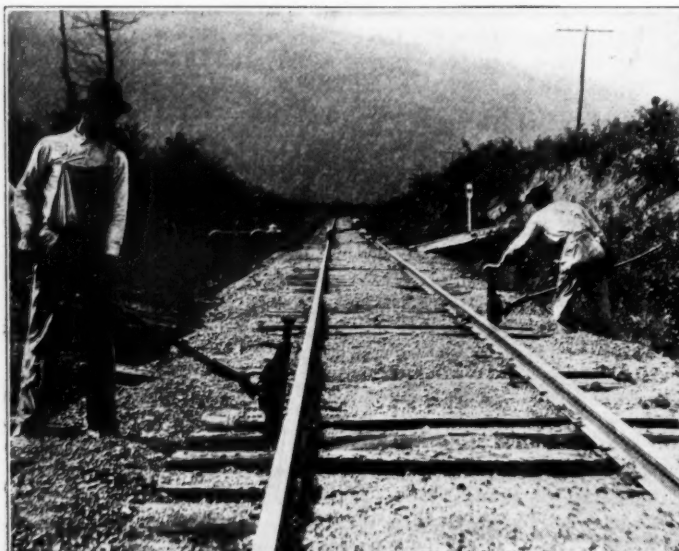
Method of Protecting Four Piers from Scour in the Iron Mountain Bridge Over the Red River at Fulton, Ark.

# Promoting Safety in the Maintenance Department

## Some Methods That Have Given the Best Results in Reducing Injuries to Track and Bridge Employees

The success of any attempt to increase the safety of railway employees depends largely on the effort and tact with which the movement is pushed in the departments having the largest number of employees and in which the work performed involves the greatest hazard. Since nearly one-fourth of all employees of American railways are in the maintenance of way department, the number aggregating somewhat over 400,000, and since the hazard connected with track, bridge and other maintenance work is at least as great as that in most other departments, it is evident

maintenance department does to the total number in all departments. In some cases the hazard connected with maintenance work has been considered higher than the average for all railway employment, as in 1912 when the Pennsylvania found that a large proportion of the fatalities to its employees were in the track forces, and in England some years ago when a royal commission placed track work among the three most hazardous occupations on a railway after a careful study of the general problem of safety to employees. In England, where the hazard



Pictures Used by the Carolina, Clinchfield & Ohio in Emphasizing Safe and Unsafe Methods for Trackmen. Above—the Use of Jacks; Below—the Arrangement of Men on a Hand Car

that an active safety campaign must pay special attention to maintenance department employees.

It is difficult to arrive at the exact hazard in any branch of railway service on account of the manner in which the official accident figures of the Interstate Commerce Commission are classified, but it can be shown that the number of fatal accidents to maintenance men bears as high a ratio to the total number of fatal accidents to all employees as the number of men in the

is accurately determined, the latest figures, those for 1913, show that one track man in 611 was killed and one in 19 injured during the year. The nearest comparable figures for accidents on American roads show a hazard practically the same as that found in England.

### APPLICATION OF GENERAL SAFETY CAMPAIGNS TO MAINTENANCE MEN

The safety departments of a number of roads are carrying on active campaigns in the maintenance department, but in gen-



eral, this work has followed that in the train service and shops and in many cases is still only partly developed. It was natural that when the promotion of safety became of active interest to railway officers a few years ago the first and most vigorous effort should be directed at the classes of employees among which the best results could be expected and where the number of accidents was the greatest. The train and shopmen could be easily reached in large numbers at the terminals and numerous methods of presenting safety cautions to them were devised, including lectures, stereopticon pictures, posters, safety committee meetings, etc. The excellent results that followed the agitation among these men on the roads that have taken up the matter seriously soon prompted the officers in charge to extend the efforts to cover employees in the maintenance and other departments.

On terminal roads or other lines with small mileage somewhat similar methods of agitation among the track men have been employed successfully, but on the larger systems it is at once evident that safety work among maintenance men is ac-

viously been employed on other roads where little is done along safety lines, so that there is not the cumulative effect of repeated agitation.

#### CAUSES OF ACCIDENTS AND METHODS OF PREVENTION

The measures necessary to promote safety vary with the causes of accidents. The causes of avoidable accidents to maintenance men can be classed roughly as defects of equipment, structures, or track, which the company alone is responsible for; wrong methods of performing work, which both the company and employees should strive to correct; and carelessness, thoughtlessness or indifference on the part of the employees. A very large proportion of all accidents fall in the last group. The Chicago & North Western, for example, has determined that over 75 per cent of all accidents to employees on duty are caused by carelessness of the individual or a fellow employee. The Pennsylvania found that in 1912 about 80 per cent of the fatalities to track men were due to being struck by trains, and the Interstate Commerce Commission accident reports show that on

## Safety Cautions for Trackmen

**Don't take chances. Think what "Safety First" means to you and to your family. Do your work the safe way and be careful to avoid injury to yourself and others.**

**Always be on the watch for trains in both directions and when you step from one track to another, ALWAYS LOOK IN BOTH DIRECTIONS FIRST. Do not stand close to rail of track while train is passing.**

**When your foreman signals you to step from track do so AT ONCE. Don't wait. Don't try to remove an extra shovelful of dirt first. That last shovelful of dirt may cost you your life.**

**Never stand or walk upon the tracks except when necessary in the performance of your work, and then watch for trains in both directions, as trains are liable to be run against current of traffic or run in either direction at any time.**

**Never use tools that have battered heads or are otherwise defective or unsafe for use. As soon as you discover a tool that is defective, put it away and call it to the attention of your foreman and get a good one in its place.**

**Always put tools or material of any kind where it cannot be struck by a train. Be particular about cleaning up rubbish you find lying near the track and never leave anything lying about for other men to stumble over.**

**Never overload handcars either with material or men. In operating handcars be sure you afford yourselves all the protection that is required by the rules.**

**Never get on and off moving cars or trains. Your duties do not require it, you are not accustomed to it and it is a dangerous practice.**

**Always play safe. Think about what you are doing and don't forget that you are working on a railroad.**

**Obey the rules. They were made for the protection of yourself and others and they should be observed to the letter.**

**Safety Poster Printed by the New York Central in Sixteen Languages**

panied by numerous difficulties. These men are scattered over the entire line in small groups, often at isolated points, and can rarely ever be congregated in large bodies. The other difficulties are practically all caused by the type of men which predominate among these employees. The work of educating track men either by printed matter or by personal contact, is hampered by the fact that a majority of these employees on many roads cannot read or understand English. Many of these foreign laborers are ignorant to a surprising degree, as illustrated by a section man on the Grand Trunk, who found a torpedo, placed it on the rail and hit it with his pick to see what would happen. Further, a large number of laborers in the maintenance department are transient. This applies not only to foreign-born laborers, but also to hobo extra-gang men who never conquer the desire to move on continually. This makes it necessary for the roads that are pushing the safety work to direct their appeals to a constantly changing force, a large part of which has pre-

the average about 85 per cent of the maintenance men killed and 37 per cent of those injured are struck or run over by cars or engines. Practically all such accidents are due to carelessness, thoughtlessness or indifference, as the men are violating the rules when they fail to clear the tracks on the approach of a train. It has been repeatedly shown that the hazard to track men increases in much greater proportion than the number of main line tracks, on account of the tendency of the men to step from one track to another rather than to clear all tracks. In England, where a board of trade rule requires a "lookout man" to be provided when there is special danger of men being struck by trains, the accident statistics show that a majority of all those killed and injured in the track force were struck while working on the right of way, or walking, crossing or standing on the tracks. While this class of causes accounts for a large majority of the accidents, it is at the same time the most difficult to eliminate, because improvement in this respect can be made only through the

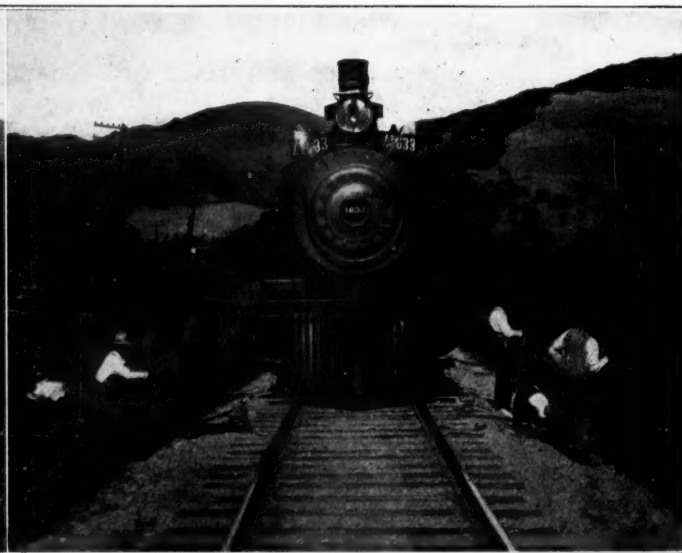
active effort of the men themselves, and the necessity for this effort is difficult to impress on them for the reasons explained above.

The promotion of safety by the correction of wrong methods of performing work is less difficult than through the eradication of carelessness because methods are largely controlled by the foremen and to change them it is only necessary to reach this smaller and more intelligent body of men. Improved methods that are being emphasized on a number of roads at present, include the proper use of hand and motor cars, the observance of a safe distance in piling material along tracks, greater thoroughness in cleaning up scrap and debris in yards and along the line, the spurring out of bunk cars, or the protection of such outfits by derails, and the requirement that bunk car doors face in the opposite direction from the main line. In any successful safety campaign, the men in the ranks must be encouraged to make suggestions freely as to methods that ought to be changed in the interest of safety, and constant vigilance is required on the part of the maintenance officers after a change in practice has been ordered to see that the foremen understand and enforce it.

Of the three classes of accidents, those caused by defects of equipment, structures, etc., are most easily eliminated, as an order from the management is sufficient to correct an unsafe condition existing on this account. The most necessary safety

the necessity for co-operation in the prevention of accidents, impress on them the results of carelessness, thoughtlessness and indifference, secure suggestions for improved methods, see that the suggestions adopted are carried out properly, induce the men to report unsafe conditions of equipment, structures, track, etc., and see that such reports receive the attention they deserve. In addition to these lines of effort which directly affect the maintenance men, the safety movement in other departments can be furthered materially by enlisting the hearty co-operation of maintenance department employees in reporting unsafe conditions that might endanger other men, such as insufficient clearances, defective brake rigging, hot boxes, etc., on the cars of trains that pass them. The latter practice is required on the Southern Pacific, partly to discover the defects and partly to insure closer attention to trains by the track men, thereby reducing the likelihood of their remaining in position to be struck by a train.

The system of promoting safety, adopted extensively on American roads, is to place a special officer or a committee of general officers in charge of the safety campaign, under whom are organized various district, division, or local committees composed of employees representing all departments. The principal distinction between the forms of this system used on various roads is that in some cases the committee members are appointed and in others



**Southern Pacific Section Men Watching a Passing Train for Defective Parts and a Typical Attitude of a Gang on the Approach of a Train Before This Order Was Issued**

measures of this kind, such as the placing of foot guards in frogs and refuge niches in tunnels, have become almost universal, and on the roads which are devoting the most attention to safety numerous steps are being taken to correct conditions involving much less danger. On at least one road, the Chicago Great Western, special care has been taken to provide bridge gangs with standard sizes of timber for scaffolding, and this road has also provided handholds on motor cars to prevent the men falling off when the car is derailed. The practice of placing footwalks and railings on deck bridges is becoming more general and partially on account of the added safety secured, machines are being used on many roads to handle rail, frogs, ties and other heavy materials wherever possible. There is also a growing tendency to secure better tools and to keep them in better repair, thus partially eliminating a fruitful source of accidents. The function of the safety department in the correction of unsafe conditions of this kind is to encourage the men to report such conditions freely, to provide an organization for considering such reports properly and for putting into effect the adopted suggestions.

A safety organization should work along several different lines in its endeavor to reduce the number of accidents to maintenance employees. It must first educate all employees as to

they are elected by the employees with certain restrictions to insure a full representation of all departments. On the Baltimore & Ohio the central committee is composed of seven men devoting full time to this work, one of whom is a former supervisor and division engineer, representing the maintenance department.

The officer in charge of the safety work or the central committee usually issues all safety literature for the road, distributes pictures, conducts meetings, etc., in the general campaign of education. Every member of all the committees is supposed to keep the safety campaign constantly in mind and strive to eradicate carelessness by any method possible. The discussions brought out in the local committee meetings are relied on to furnish suggestions both as to methods and equipment which should be changed in the interest of safety, and these suggestions are in turn reported to the higher committees until the best and most feasible are sorted out and adopted. On some roads postcards are also furnished the men on which to report any unsafe conditions which they discover, and on the Baltimore & Ohio, in order to overcome the reluctance of the men to report infractions of the rules and other matters involving safety, each track supervisor, master carpenter and signal supervisor has been appointed chairman of a sub-committee composed of his men. The discussions




at these sub-committee meetings have helped materially to draw out the desired reports. As an example of the number of suggestions received and acted on by the safety committees of the large roads, the Chicago & North Western has adopted nearly 10,000 suggestions in the last two years.

On roads where no safety committees are organized the safe condition of equipment, structures, track, etc., is made a matter of special observation on the regular inspections of the engineering department, and an effort is made through the regular officers to impress the men with the necessity for taking care and to insure the observance of all safety rules.

#### LITERATURE, PICTURES AND SPECIAL METHODS

Whether safety committees are used or not, some form of printed matter is usually found the most effective in presenting



## The Chesapeake and Ohio Railway Co.

The Chesapeake and Ohio Railway Company of Indiana.

### SUGGESTIONS FOR SAFETY

MAINTENANCE-OF-WAY DEPARTMENT

**LOOK OUT FOR TRAINS.** NEVER step on any track without first looking both ways. When stepping out of the way of an EAST BOUND or a WEST BOUND train on DOUBLE TRACK, DON'T step in the way of trains going in the opposite direction; keep clear of BOTH tracks.

DON'T operate any hand, velocipede or motor car at night without proper light.

DON'T move hand car at all, without a man facing both directions.

DON'T jump on or off moving trains, your work does not require it.

See that all material is kept at least SEVEN FEET from track, where men on side of cars will not be struck by it, and no one will stumble over it.

DON'T wait until regular cleaning up time to pick up draw-bars, brake shoes and other litter on yards and beside the tracks; pick it up and dispose of it TO-DAY

REPORT EVERY UNSAFE CONDITION TO FOREMEN IN CHARGE OR PROPER PERSON

#### Safety Poster Conspicuously Displayed on the Chesapeake & Ohio

safety messages to the men, particularly those in the maintenance department who cannot be reached in person by the higher officers. Ingenious minds have discovered innumerable ways of keeping the idea of "safety first" before all employees until now one reads the slogan on pay checks, coat lapel buttons, tool houses, telegraph poles, bulletin boards, hand cars, lead pencils, etc. Other methods applying in general or specifically to the maintenance department include courses of instruction in safe methods, articles in employees' magazines, the publication of special safety papers or regular bulletins, special safety rule books and cards to be presented to every new employee warning him to be careful. It is frequently necessary to publish such literature in several languages in order to reach the foreign-born laborers. At least one road, the Queen & Crescent, requires the foremen to post all circular letters in their tool houses so the men may have a chance to read them. This road also issues statements of all injuries, showing those among the men of each track and bridge supervisor, thus creating a healthy competition. The general manager of the San Pedro, Los Angeles & Salt Lake issues a monthly bulletin calling attention to causes of accidents and their prevention, and the Chicago & North Western issues circular letters to the division superintendents at intervals, each taking up all recent accidents of a certain class and showing how each could have been prevented. Several companies have issued special rule books covering the operation of motor cars.

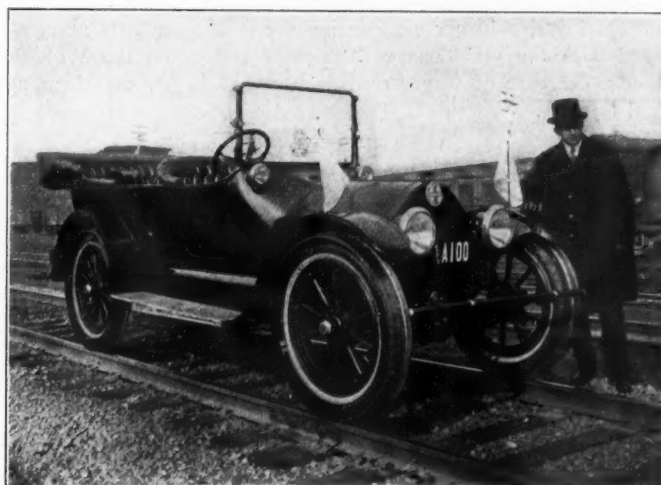
The use of pictures either framed or projected from a lantern is an important feature of safety work, especially with foreign-born laborers who are often difficult to reach in any other way. The Southern Pacific shows stereopticon pictures in its examination car, traveling over the entire system, covering safety methods in the maintenance and other departments. The El Paso & Southwestern, in attempting to reach the Mexican laborers on its lines, framed a series of pictures showing right and wrong methods of handling work and hung these pictures in every

tool house and in every extra gang commissary car on the road.

The Atchison, Topeka & Santa Fe recently undertook to present safety talks in Spanish to Mexican track men by means of phonographs, which many of them own and all are fond of listening to. The commissioner of safety on this road plans to travel over the system in a motor car giving this talk to every gang he meets. If a phonograph is found, extra cylinders are to be left for the repetition of the talk, these records being returned later to be used again.

The Chicago, Burlington & Quincy has converted a passenger car into a lecture car for the use of the "safety" department. This car is equipped with a stereopticon lantern and screen, while numerous quotations relative to the work of this department with statistics are posted on the sides. During the past summer this car and lecturer were assigned to work in the maintenance of way department. The car was set out on a siding with the camp cars of an extra gang and a lecture was given in this car in the evening. During the following day the car was moved to the next camp and the lecture repeated. In this way the car covered several divisions during the past summer.

In the campaign against carelessness a number of special methods have been worked out. On the Elgin, Joliet & Eastern one man is selected, called a "departmental safety man," from each gang, to give special attention to safe practice on the part of his fellow workmen. He is instructed carefully by the foreman and serves as a check on any careless men. The Pennsylvania uses a system of efficiency checking to see that the safety rules are being obeyed. Several roads, including the Queen & Crescent, discharge a man immediately who has been injured several times through carelessness and also instruct foremen to dismiss men even before injuries occur if they show themselves to be habitually careless. The Baltimore & Ohio instructs the officer next above



Car Used on the Santa Fe to Take the Safety Message to the Maintenance Forces

the injured man to talk over the injury with him as soon as he returns to work, so that both may have the result of carelessness impressed upon them. Whistles to warn men are used by foremen on a number of roads, including the Lehigh Valley, the Pennsylvania, the Baltimore & Ohio, and the Chicago & North Western. These whistles are found to be more efficient in attracting the men's attention than a call. As an illustration of the methods used to encourage the men to make suggestions, the foreman on the Lehigh Valley who suggested the use of a special type of whistle for this purpose was placed on the year's honor roll, consisting of one man from each department, and was given a month's leave with pay.

Some special forms of safety work undertaken by various roads are the investigation of sanitary conditions in bunk cars and lodging houses on the Baltimore & Ohio; the special weekly cleanup days instituted in the yards on the Belt Railway of Chicago; the special man detailed on each section to pick up obstructions from

the tracks of the Chicago Junction, a short terminal and switching road, and the provision of goggles by the New York Central for men engaged in chipping rails or other work endangering their eyes.

#### RESULTS

The results of the safety campaign already undertaken in the maintenance department are certain but difficult to measure accurately. The accident statistics of the Interstate Commerce Commission do not indicate any marked decrease in the number of accidents to maintenance employees, but as stated above, these figures are subject to question and the best indication of work so far done and the possibilities of future work along this line is furnished by the reports of individual roads that have carefully studied this subject. The following typical examples are not necessarily the record performances, even on the roads quoted, but indicate in a general way what results are being secured. On the Baltimore & Ohio the number of injuries to maintenance men reported to the Interstate Commerce Commission during the first half of 1914 was reduced 66 per cent as compared with the same period in 1913. On the Chicago & North Western the reduction in accidents during the fiscal year 1914 as compared with the fiscal year 1910, when the safety work was started, amounted to 39.3 per cent in deaths to track men, 27.7 per cent in injuries to track men, 33.3 per cent in deaths to bridge men and 38.8 per cent in injuries to bridge men. The average decrease in accidents to all employees was 41.1 per cent, showing that the effectiveness of the movement in the maintenance department has been very nearly up to the average. On the Chicago Great Western the safety work in the maintenance department has decreased accidents until the maintenance men sustain only 29 per cent of the accidents, although they form 43 per cent of the total number of employees. The El Paso & Southwestern safety department has succeeded in reducing the number of fatal accidents to track men 37.5 per cent and the injuries 16 per cent during the fiscal year 1914 as compared with the previous year. Similar figures on the Wabash show a decrease of 46 per cent in fatal and 11 per cent in non-fatal injuries.

### LINING THE SNOQUALMIE TUNNEL

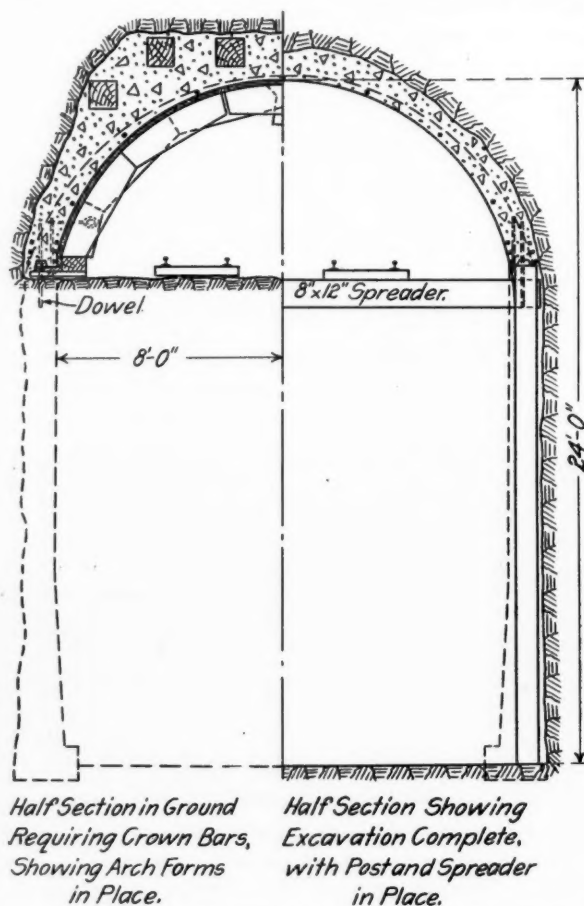
In the construction of the Snoqualmie tunnel through the summit of the Cascade mountains about 60 miles east of Seattle, Wash., the Chicago, Milwaukee & St. Paul is placing the concrete lining for the arch section before excavating the bench material, for a distance of about 3,000 ft. near the east end. The general details of construction of this  $2\frac{1}{4}$ -mile tunnel were described in the *Railway Age Gazette* of May 29, 1914. The greater portion of the tunnel was driven from the west portal where the European or bottom-heading method was adopted. At the east end the approach cut was not completed at the time it was desired to start the heading and a top center heading was driven at this end. This heading was then widened out on each side to the full arch section.

The rock at the east end is badly stratified in many places, the seams being filled with talc, and the tunnel bore requiring immediate support. The reason for placing the permanent lining before the removal of the bench was to save the expense of the customary timbering under such conditions and to provide additional safeguards for the men. Sectional forms were built, the concrete was brought in in  $\frac{1}{2}$ -yd. cars which were dumped into boxes between the tracks, and it was then shoveled into the forms. In some instances the character of the material made it necessary to support the roof temporarily with crown bars which were concreted in place.

After the arch ring was completed, shafts were driven to grade along one side of the tunnel at intervals of 1,000 ft. and connected with a 9 ft. by 8 ft. drift on grade. The drift was then provided with temporary stoping timbers and the remaining bench material was removed by cars, after which the side walls were poured in the usual manner through a chute. The closure between the side walls and the arch was made as far as pos-

sible by placing the concrete by hand and before the forms were removed the joint was grouted, the grout gaining entrance to the joint by means of a 2-in. pipe placed in the arch lining. For a part of this work a Ransome grouting machine was used and on the remainder a small gun was employed which was built on the job.

All of this bench has now been removed below this arch without any settlement or indication of cracks and the lining has



Sections Showing Method of Placing Concrete Arch Lining Before Removing Bench Excavation

been completed within the past week. It has, therefore, resulted in a considerable saving in timber and in cost of construction. The tunnel was placed in service for the regular passage of trains on January 15. In common with other details of this project, all of which are being handled by company forces, this method was developed by J. I. Horrocks, engineer and superintendent of construction, under the general supervision of E. O. Reeder, assistant chief engineer, and C. F. Loweth, chief engineer, of the St. Paul.

**EARLY CAST IRON.**—At a recent monthly meeting of the Ipswich Engineering Society, of England, an interesting lecture was delivered by Robert Buchanan, of Birmingham, on "The Origin and Development of the Foundry Cupola." Mr. Buchanan said that he owned what he believed was the oldest piece of iron in the world, a portion of a gully grate from the floor of some ruins at Ephesus, which still showed the iron crystals. The first record of cast iron being used was in 1543, when in Sussex a man named Hogg made cannon. Personally he believed that the system must have been discovered before, because in 1595 it was stated that cannon of 6,000 lb. weight were made, and he did not think such progress could possibly have been made in 50 years. The first record of a cooking-pot being made of cast iron was 160 years after cannon were first cast, so that it seemed that in those days armaments led the metallurgical world as they did in a great degree at the present day.—*Engineering*.



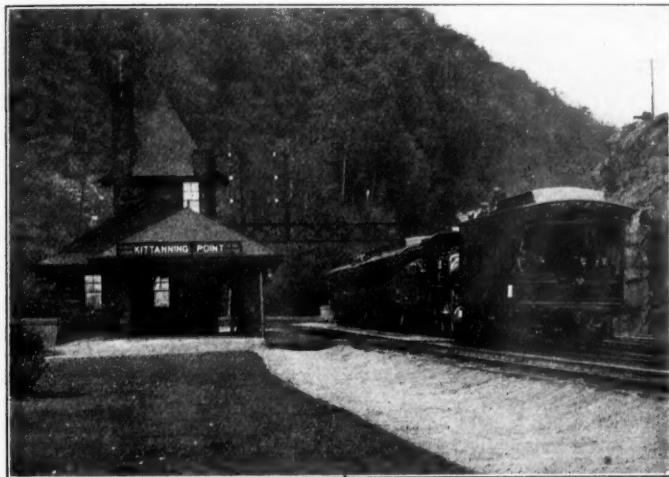
# Development of P. R. R. Track Inspection System\*

## Narrative of Consecutive Steps Taken to Secure an Equitable Method of Judging the Track Conditions

By JOSEPH T. RICHARDS†

Consulting Engineer Maintenance of Way, Pennsylvania Railroad, Philadelphia, Pa.

As far back as 1873, when Thomas A. Scott was president and A. J. Cassatt was general manager, the Pennsylvania Railroad had inaugurated "the General Manager's Annual Main Line Track Inspection." At first the inspecting party was limited to employees of the maintenance of way department, but in later years it was made to include invited guests from all the other departments. It was an occasion well suited to bring together a large company of track men, and was more or less of a social and educational event, making for good fellowship, and at the same time gave a favorable



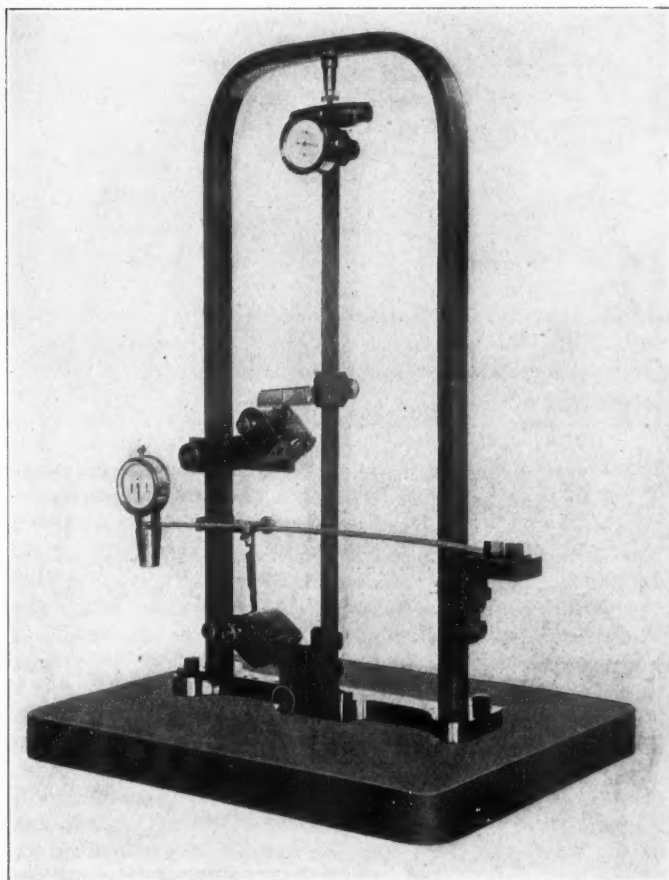
The Track Inspection Car on the P. R. R. Which Is Intentionally Made Hard Riding

opportunity for the discussion of track subjects by all the experts in that line. Thus the inspection, lasting nearly a week, was found to be a model method of teaching that which was not found in books. It had a tendency to broaden the views of the men and prevented them from becoming localized; it gave them a knowledge of the geography of the road; it brought them to know each other, it aided largely to create an *esprit de corps*; it introduced the men of lower rank to the higher officers, and it furnished the opportunity for one member to tell something about a good practice on his division in exchange for what his companion could tell of his discoveries and practice. This exchange of views, in many cases, continued throughout the year by correspondence, and in all it established a devotion to the common cause which made interested and painstaking men and soon convinced the management that a large inspection once a year was money well spent.

The annual inspection was made in the fall after the summer's work had been done and the year's appropriation spent, to bring the track up to its best, as it should be, at the beginning of the winter season. It was the practice in the early years of the inspection to assemble the entire party at the New York end of the line and for the first day to make a fast run west to Pittsburgh, the train consisting of first-class Pullman cars and coaches for the purpose of testing

the riding qualities of the track under high speed and also for trying out the staying qualities of the best class of locomotives on a long run. There was considerable merit in this fast, one-day run, but after some years it was abandoned.

The second day the party started east in improvised inspection cars made by building tops or shelters over ordinary gondola cars, with seats, one raised above the other in gallery style, each car seating about 35. These cars were pushed ahead of locomotives at a slow speed to allow the inspectors to see the good and bad features of the roadbed, track, station grounds, ditches, etc. They were divided into committees, each having the task of marking on cards the grades for as many features as they had time to observe. One committee was for line and surface, one for switches and signals, another for ditches, ballast and spacing ties, and another for sidings, road crossings, station grounds and policing. The inspection occupied one day on each superintendent's division



The Present Type of Device Used for Measuring Horizontal and Vertical Movement of a Car

or four days in all from Pittsburgh to New York. From the marks turned in on the inspector's cards each supervisor's section received its rating and the premiums were awarded accordingly.

### SPECIAL TRACK INSPECTION COMMITTEE

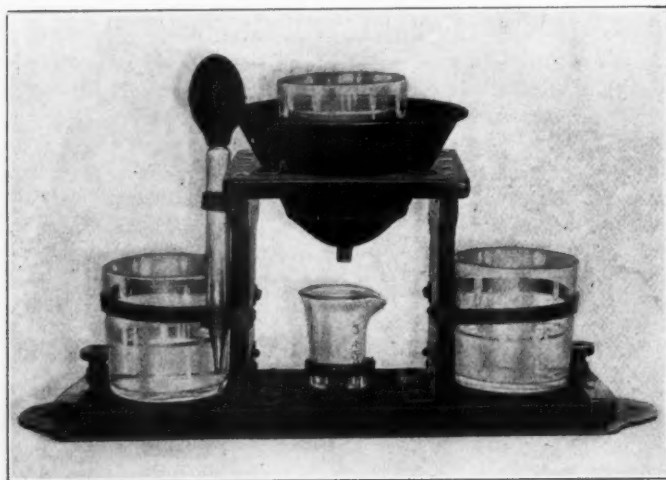
Each year there were naturally some changes made in the method of inspection, following changes and improvements

\*Copyrighted by Joseph T. Richards.

†Mr. Richards has been intimately connected with the maintenance of way department of the Pennsylvania Railroad almost continuously since August, 1869, holding the position of engineer maintenance of way for ten years, and chief engineer maintenance of way for ten years, before his appointment as consulting engineer maintenance of way in 1913.

made in the track standards. The old popular annual inspection of 1873 had been in practice for about a quarter of a century; the amounts paid for meritorious work had increased year by year, and a feeling had grown among the maintenance of way men that more frequent inspections should be made, for various reasons, and that a small committee of experts on line and surface, acting frequently, would produce better results than a party of, say, 300 making an inspection but once a year, and, furthermore, that the inspections should be made at times unknown in advance to the track men. This was about 1897, when Frank Thomson became president. Mr. Thomson had been perhaps the most critical general manager on track that the road ever had and when he became president he lost very little of his sensitive touch which made him an expert in detecting rough tangents or swinging curves as his car would pass over the line.

In order to advance the efficiency of the service and meet the views of various officers, the president, in 1897, requested the general manager to appoint a special committee for the purpose of inspecting the track periodically, to be done about once a month or not less than once in seven weeks. After careful consideration it was decided that the committee was to inspect and report as to the riding of all of the cars of the train, not merely of their inspection car, but noting the



The Present Improved Form of Water Spiller Arranged with a Basin to Catch the Spill and a Graduated Measure to Determine Its Amount

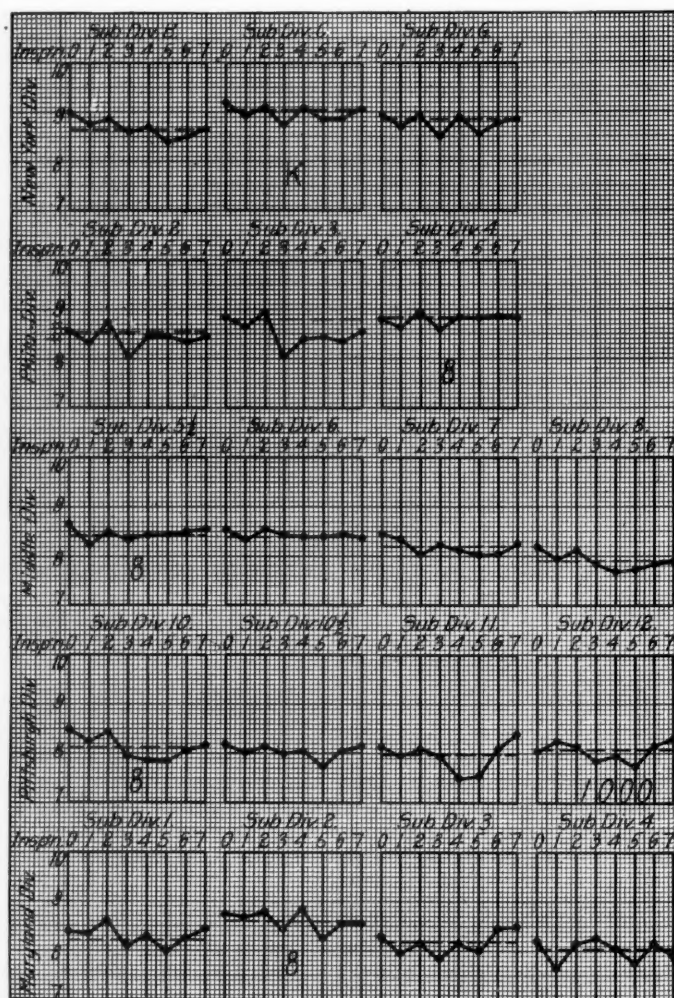
differences, if there were any, between the cars in the front end of the train, those in the middle, and those in the rear. While track work belonged entirely to the maintenance of way department the committee could with propriety criticize the riding of a car and take up and discuss with the motive power department any defect in the car, wheels, trucks, springs, gaging of wheels, etc., that they thought necessary.

The committee consisted of the chief engineer maintenance of way as chairman, with the engineer of maintenance of way and three division superintendents of branch roads, who, having started in the service as rodmen in the maintenance of way department, had passed through the grades of supervisor and division engineer to superintendent. This service well qualified them as judges of track and train and made them efficient and critical members of the committee. Furthermore, as this committee's work was confined wholly to the main line tracks, those superintendents, being from branch lines, were naturally impartial in their judgment, as they were not called upon to criticize their own divisions.

The committee soon organized for business and adopted a working program which still continues. For a tour of inspection on a western run, starting from Jersey City, they pick up the division engineer and take him along over his

division from Jersey City to Philadelphia. It is his duty to take notes of the riding of the cars on each section of his track and particularly note any jar or unusual motion given to the cars, recording the exact location. Upon arriving at the end of his division he is allowed to return to get in touch with his supervisors and track men to remedy the defects promptly, so that at the next inspection the committee may expect to find the track improved and the uneven riding of the train eliminated. It is to be noted that the responsibility for defects in track is placed where it properly belongs, upon the division engineer and his supervisor, just as the president had placed the responsibility on the special inspection committee and expected them to bring him the results he was asking for, supplementing the resident officer's experience by their own larger and wider training.

Each division engineer in turn is taken on the inspection



A Typical Chart Showing the Special Inspection Committee's Marks at Each of the Seven Inspections for One Year, Indicating Also the Prize Winning Supervisor's Divisions

car with the committee to ride over his division. On the return run, the eastbound track is inspected in the same manner so as to cover both passenger tracks, and frequently a run is made on the freight tracks to determine their relative condition. The members of the special track committee also take notes carefully and rate the various divisions, using marks of merit ranging from 1 to 10—10 denoting perfect condition; 5 medium, and 1 very bad. This record is kept in a book, with numerous side notes and comments made for each inspection, and a comparison shown of each supervisor's division. There is also a chart made to show graphically the rating given for each inspection.



Upon the result of these inspections the committee awards the annual prizes to the supervisors having the best line and surface on their respective superintendents' divisions. These prizes and the honor attached are sufficient to create competition and a healthy rivalry among the supervisors. In addition, for the division having the best track of all during the entire year, a prize of \$1,200, termed the "Klondike," is awarded, \$800 going to the supervisor and \$400 to the assistant supervisor of that division, together with a complimentary letter from the general manager. For the division having made the greatest improvements during the year \$1,000 is awarded, \$700 going to the supervisor and \$300 to the assistant supervisor. The award on each superintendent's division amounts to \$800—\$600 going to the supervisor and \$200 to the assistant supervisor. The general manager, through this inspection committee, distributes annually \$5,400 to the trackmen as the result of these main line inspections. This amount, however, is only about one-half of the premiums paid to track men on the P. R. R. system, including 21 other divisions operating under the general manager of Lines East of Pittsburgh and Erie.

#### DEVELOPING MECHANICAL AIDS FOR JUDGING TRACK CONDITIONS

The awarding of these premiums placed a serious responsibility upon the special inspection committee, which from the beginning made the members extremely anxious that the prize should not go amiss, as it would be manifestly unfair for a supervisor to receive the prize when not entitled to it, and just as unfair for a supervisor to miss the prize who was entitled to it. It was recognized that there must be an unmistakable way of determining the movement of the car, both horizontally and vertically. A good judge of track by observation and through the sensibilities can very well determine when something is radically wrong in the swing of a car, but it was important that the number of vibrations on each division and the degree of same should be told with the greatest of accuracy, so the committeemen busied themselves in finding aid through some mechanical means. This idea was not a new one, but none of the mechanical inventions had quite filled the requirements.

The latest production had been in use on the Pennsylvania for some years, and, in fact, it was still in existence—a small car called the track indicator car, which was made specially to inspect track. It weighed 25,100 lb. and cost about \$5,000. Somewhat similar cars have been made and used by other railroads. In its use a special run was made over the road at slow speed with several attendants in charge, and through mechanical contrivance would, if operated at a speed to suit its purpose, detect and register the rough places in the track such as badly worn rail or low joints in the surface; it was also supposed to give the elevation of the curve, the width of the gage, etc. This car turned out a paper ribbon of great length on which, by means of a fountain pen, those features of the track were registered, being located with reference to mile posts. The ribbon was taken off in sections, given to the division engineer as a guide for his supervisors and from the supervisors to the track foremen. But it was quite annoying to the ordinary track man to take this ribbon, marked with curve elevations, width of gage, low joints, etc., and attempt to apply it to the right spot on the track, so they generally condemned it. Like all things, it was fallible and the possibility of error with its annoyance made it very unpopular. The track foremen stated that after all they had to find the defect in the track in their usual way and could not depend upon the ribbon reports turned out for them by the track indicator car. The car was given several years of patient trial, but, besides annoying the practical track men, it created no incentive for good work. It was too far removed from the conditions governing a passenger car at the speed of a scheduled train. It had a slow speed of its own at which there was no means of telling how a curve suited the passenger trains using it every day. Its report was confined to its own irregular movements, and was of little con-

sequence. It was a "wet blanket" everywhere it appeared and when it finally got into a wreck and was broken up all the track men were happy.

The members of the committee were quite willing to cut out the ribbons, but they recognized that it was no easy task to tell always whether the defects were in line or surface, on curves or tangents, etc. So they started with some other old principles that had been used. At first they suspended a hammer by a flexible steel stem fastened to the roof of the car. They watched the track for defects and the steel hammer for oscillations. When it was steady it showed that the track was good; when it would swing violently the track was bad and the car was riding roughly. They then put a bell on each side of the two-faced hammer and counted the number of bell taps on each supervisor's division. The division having the fewest number would get the best mark. The committee also filled glasses with water to within a quarter of an inch from the top, placed one on each side of the car on a window sill and counted the number of water spills. After this the committee had the distinctive appellation of "the water spillers." There were many errors in the water spills, but the track men would work very hard to get a report showing as few as possible. It was amusing and had some points of merit.

These contrivances, however, were poorly developed and did not tell nearly enough. They may have been better than the judgment of a sensitive committeeman, depending upon his eyes and nerves, but something better was looked for and the committee soon abandoned the long suspended heavy hammer and made a small one on a vertical flexible steel stem, and fixed it in a wooden base. This they placed on the floor of a car, with the usual bell on each side of the hammer, and counted the bell taps. This device was criticised, however, because the bells were a fixed distance from the hammer and the hammer had to swing the whole distance to give a bell tap, and it was noticed that the hammer would vibrate on its stem very many times without striking a bell. It was then decided to abandon the bells and put a pedometer on the hammer stem, near the top, which would count the number of vibrations. This was quite an improvement over the bells. Besides, it relieved the committeemen of the work of counting the bell taps. This arrangement was criticised because the number of vibrations is not as important as the distance the hammer stem travels. One section of track might be in fairly good condition and yet have a great number of small vibrations registered against it, while another section in poor condition would get larger vibrations, but not so many of them. Therefore, it was decided to get the distance that the hammer stem traveled per division or per mile of track, and for this purpose a cyclometer was added, with a ratchet attachment to wind up and give the distance the hammer stem traveled, while the pedometer remained to count the number of vibrations. Thus the committee was gradually closing in on a method to tell the actual condition of the track from the movements of the car.

In the next analysis of the mechanical contrivance it was found that the pedometer and cyclometer on a vertical stem would give the swinging movement of the car, but the vertical movements were not yet registered. A car might go up and down very quickly and a vertical hammer stem almost stand still, so to get the vertical movement of the car on the same instrument, a horizontal stem and hammer were added to the frame and equipped like the vertical one with pedometer and cyclometer. Thus the committee now has a small compact instrument of the greatest simplicity with but few parts, weighing about 22 lb., that can be picked up, easily carried about and placed with its wood base on the floor of any car.

#### RATINGS AND PRIZE AWARDS

After taking the reading of the two pedometers, two cyclometers and two water spillers, the committee considered

several methods of getting a figure that would represent the condition of the track, and finally adopted the easy formula of taking the sum total of all of the readings and dividing by the miles traveled. The result may be called the vibrations per mile of track. From these figures the divisions are rated, and the committee, taking them as a guide, makes a chart to record the several inspections of the year and from which the prizes are awarded. By a reference to this chart it will be seen that the division marked "K" is the best, and consequently entitled to the "Klondike" prize of \$1,200; that those marked "8" are the best on each of the superintendent's divisions and are entitled to the \$800 prize, and the one marked "1,000" takes the \$1,000 improvement prize. In this case the graphical method does not indicate so clearly all the conditions which affect the result and on which the awards are based.

While the original plan of a general inspection once a year is still adhered to, the markings do not determine the prize winners. These tours are held in high esteem by all departments. The influence is far reaching, extending to all classes of employees and their neighbors as well. On this day schools in villages adjacent to the railroad give a recess to the children for the hour of the passing of the several

way department, its history is written from a mental library of the work of a quarter of a century in the Pennsylvania Railroad service, with the hope that it may be of possible interest to the outsider, including the traveling public, to see how much study, vigilance and care is expended by railroad men to insure smooth riding cars to carry them with the greatest comfort and safety.

### A UNIQUE METHOD FOR THE REPLACEMENT OF TRUSSES

A unique method for the replacement of several through truss spans was adopted recently in the renewal of the Ponnar bridge on the South Indian Railway. This bridge was renewed in the dry season when, in common with other streams in this country, there was little or no water in the river. This condition permits the laying of temporary tracks across the river bed for construction purposes and even in some instances for main line operation during reconstruction.

In the replacement of the Ponnar bridge the trusses were assembled in a yard near one end of the bridge. To convey them to their position in the structure, a device known as a river

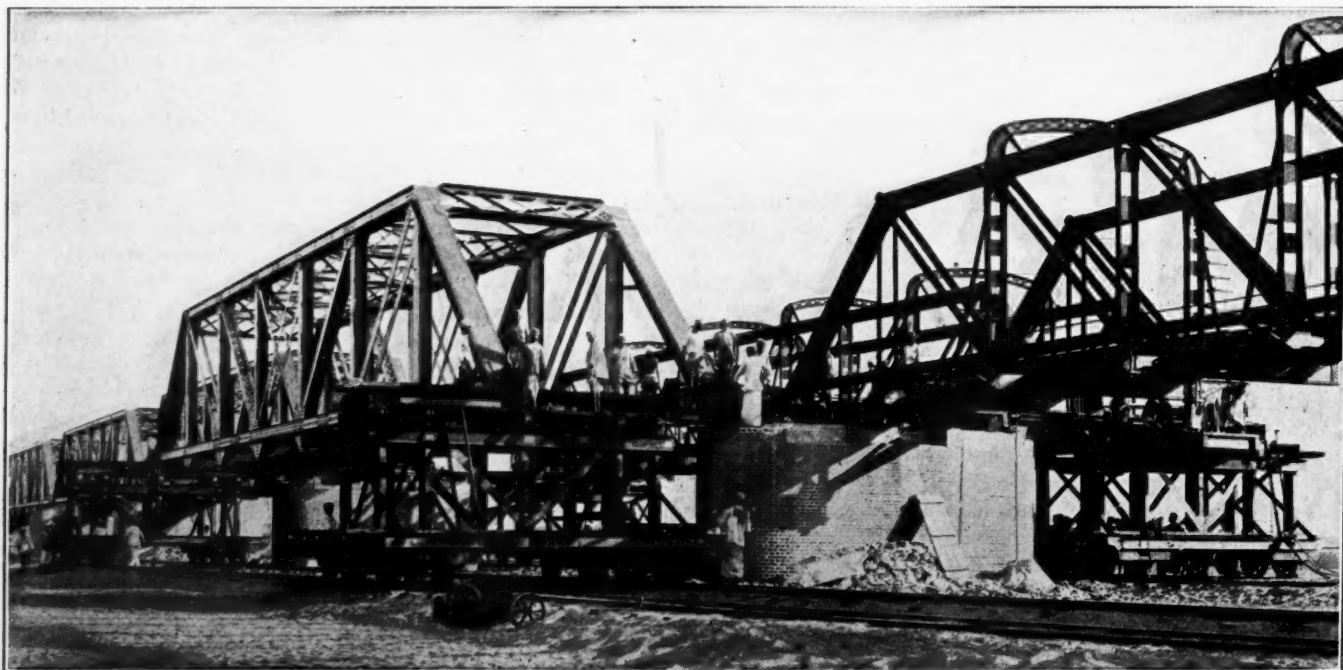


Fig. 1—River Trolley on the Left to Transfer New Span to Pier. The One on the Right to Receive the Old Span

inspection trains, flags are waved and men and women stand in groups at the stations to greet and cheer the railroad men as they pass. The first day's run ends at Harrisburg, and the prizes are announced and delivered soon after the arrival. Up to this time no one outside of the general manager and his staff officers are supposed to know who are the successful men in the year's competition. The announcement is made at a meeting of the entire party by the chairman of the special inspection committee, representing the general manager. The successful supervisors and assistant supervisors are invited to come forward to the platform and receive checks for the money and complimentary letters from the general manager. The letter is much appreciated, for it is looked upon as conveying as much honor and distinction as the money—besides, it is found to stay with the men longer than gold.

This in brief tells the story of the development of one item in the maintenance of a reliable track standard. Although this is one of the smallest subjects in the maintenance of

trolley was employed, two being required for each span. Each trolley consists of two six-wheel trucks running on parallel tracks and carrying a framework of steel girders supporting a timber platform, as shown in the accompanying photographs. These parallel tracks extend from the place of erection of the span out across the river bed to a point opposite their final location. The top of the framework corresponds in height with the elevation of the piers of the bridge.

The principal point of interest lies in the method employed to raise the completed spans from the level at which they were assembled to the deck of the river trolley. To accomplish this two ramp trolleys were employed for each span. They are built up similarly to the river trolleys with steel girders carried on eight wheels. Within this framework is gearing that engages with a rack railway. Outside the trolley is located a worm gear which consists of two worm wheels with corresponding worms on a shaft which is turned by eight men, four of whom sit between the worm wheels and two at each end, as shown in Fig. 2. The framework is inclined to the angle of the ramp



with the upper deck horizontal, to maintain the span in a vertical position during its transference to the river trolleys. Cables lead from each end of the ramp trolley to a winch to serve as brakes.

After being transferred the span is drawn along the track to its required position at the bridge by two gangs of men. Prior

While no prizes were awarded, the results of the markings of the committees were compiled on a sheet giving the rating of each section, subdivision and division. Supervisor J. Sheehan on the New York division received the highest rating of 97.51 and Supervisor M. J. Greeney on the Buffalo division was second with a rating of 96.69. The highest rating given any section was that

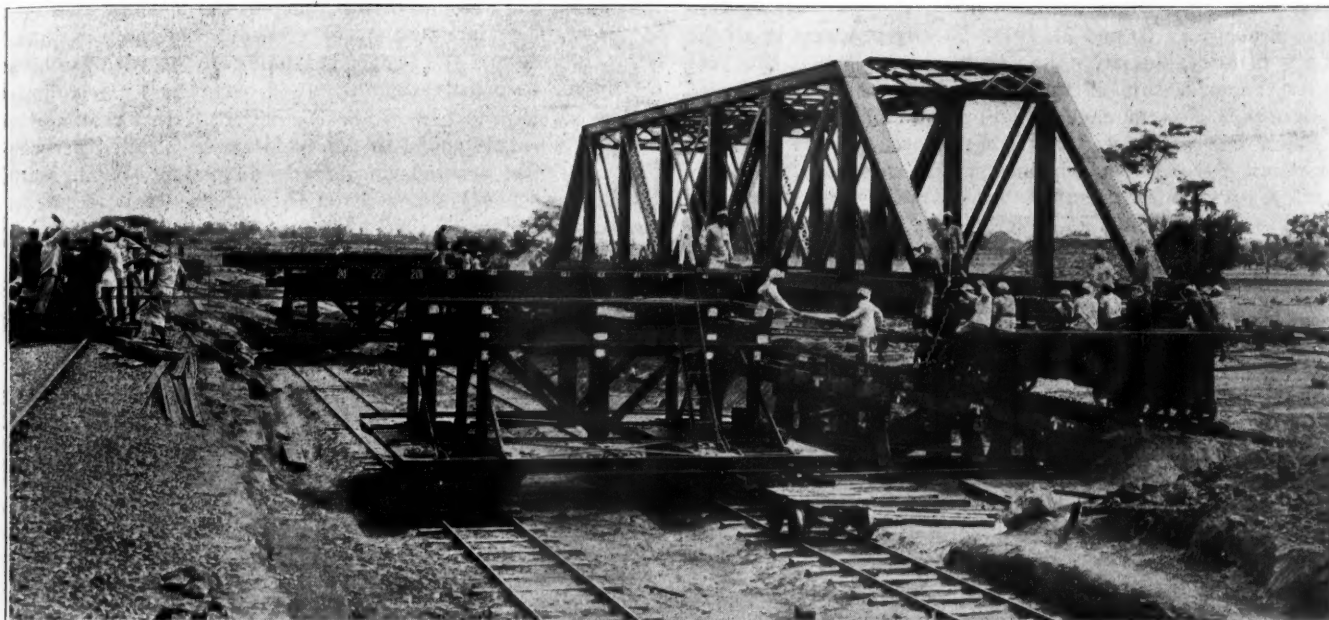


Fig. 2—Raising and Moving a New Span onto the River Trolleys

to the arrival of the new span at the structure, the old span is run onto river trolleys laid on a track on the opposite side of the bridge, as shown in Fig. 1, preparatory to its removal to the banks for dismantling. The old span is lowered to the ground by means of the ramp trolleys.

## RESULTS OF ANNUAL TRACK INSPECTIONS

### THE ROCK ISLAND

The Rock Island Lines have awarded prizes to those roadmasters and section foremen whose track showed the greatest improvement during the past year. A prize of \$100 was awarded to one roadmaster on each division and a prize of \$50 to one section foreman on each roadmaster's division. The names of the successful roadmasters and their divisions are as follows: Illinois division, J. L. Jensen, Bureau, Ill.; Iowa division, J. B. Pugh, Atlantic, Ia.; Missouri division, E. Sullivan, Washington, Ia.; Cedar Rapids & Des Moines Valley division, C. Linehan, Cedar Rapids, Ia.; Minnesota division, C. H. Gruver, Manly, Ia.; Dakota division, T. W. Brown, Dows, Ia.; St. Louis division, V. B. Simpson, Eldon, Mo.; Kansas division, J. G. Hutchinson, Clay Center, Kan.; El Paso division, J. H. Logan, Pratt, Kan.; Nebraska division, W. E. Brown, Fairbury, Neb.; Colorado division, J. D. Sullivan, Colorado Springs, Colo.; Arkansas division, D. B. Griffin, Booneville, Ark.; Indian Territory division, James Bolton, Haileyville, Okla.; Louisiana division, R. T. Gollehon, Eldorado, Ark.; Pan Handle and Amarillo divisions, George Woods, El Reno, Okla.; Oklahoma and Southern divisions, J. O'Connor. In addition, 48 prizes were awarded to section foremen on as many roadmasters' districts.

### THE LEHIGH VALLEY

The Lehigh Valley has recently completed a report of its annual track inspection made on November 4, 5 and 6. This inspection was made by two committees, one of which observed the condition of line, surface, guide posts, anti-creeper and insulated joints, while the other observed the condition of ties and tie spacing, ballast, sod line, drainage and general appearance.

at Oak Island on the New York division which received a mark of 97.83.

### THE LACKAWANNA

The annual track inspection of the Delaware, Lackawanna & Western was made in November, 1914. The results of this inspection, which have just been made public, show that J. Sexton, roadmaster on the Morris & Essex division at Hopatcong, N. J., received the highest rating of 91.16, while P. Quinlivan, roadmaster on the Buffalo division at Buffalo, was second with a standing of 90.19. The average for the entire road was 88.6. The ratings were made by a committee of three experienced engineers not connected with the Lackawanna.

**ENGLISH RAILWAY PLANS TO ENCOURAGE BEET SUGAR PRODUCTION.**—The London & South Western is taking steps to encourage sugar beet culture in its territory. That sugar beet could profitably be cultivated in Great Britain has long been an article of faith with the up-to-date agriculturist, and it is felt that the present time is very opportune for the establishment of the industry on a practical basis. What the South Western has done is not only to make an extensive survey in Surrey, Wilts, Hants, Somerset, Dorset, Devon and Cornwall, and to ascertain which areas are suitable, but also to secure co-operation between farmer, carrier and manufacturer. A large meeting of Wiltshire farmers and land owners has already been held at Salisbury for the explanation of the scheme, and similar meetings are to be held early this year at such typical centers as Yeovil, Winchester and Basingstoke. An English contemporary remarks: "Hitherto, one of the stumbling blocks in the way of the British beet sugar industry has been the difficulty of raising sufficient local capital in the various districts when it was impossible to guarantee an adequate permanent output, but that difficulty is now believed to have disappeared, and it will certainly be possible to obtain all the capital required. Experience on the other side of the Atlantic shows that the policy of helping the farmer benefits the railways as well as the agriculturists, and there is no reason to doubt the mutual advantage that will result from the South Western's patriotic scheme."

# American Wood Preservers' Convention at Chicago

## Report of the Eleventh Annual Meeting Held This Week Including Abstracts of Papers and Discussions

The eleventh annual convention of the American Wood Preservers' Association was held in the Congress Hotel, Chicago, January 19, 20 and 21, 1915. Steady progress in all the affairs of the association has been shown during the year under the leadership of the executive committee composed of George E. Rex, manager treating plants, Atchison, Topeka & Santa Fe, president; Carl G. Crawford, general manager, American Creosoting Company, first vice-president; R. S. Manley, president, Creosoted Wood Block Paving Company, second vice-president; F. B. Ridgeway, third vice-president, and E. J. Angier, superintendent of timber preservation, Baltimore & Ohio, secretary-treasurer. The registration of 120 members was the largest in the history of the association.

### BUSINESS SESSIONS

A business session was held at the opening of the convention on Tuesday morning at 10 o'clock and another at the close on Thursday.

In his opening address President Rex called attention to the effect of the European war on the wood preserving industry and the opportunity which is now presented to the Association to meet the problems presented by this calamity through conservative and unanimous recommendations as to the best practice in the treating business. He urged the members to lay aside personal considerations in the adoption of standard specifications and emphasized the importance of concerted efforts on the part of committee members in making the committee work of the greatest possible value.

The secretary's report showed an increase in membership during the past year of 90. This brings the total membership up to 265, the increase over last year amounting to more than 50 per cent. There are now 38 railroads represented in the association by 75 members.

A committee on Constitution and By-Laws recommended a number of changes in the constitution. The most important changes were the addition of a junior membership grade with an entrance fee of \$5 and annual dues of \$3, the extension of the list of those eligible for corporate membership to include city engineers, professors and instructors in institutions of learning, railroad, consulting, forestry, county, highway, contracting and inspecting engineers, engineers of tests and city chemists; the change in associate membership eligibility to "any person interested in the sale of material or equipment used in the wood preserving industry"; the addition of five members to the executive committee in addition to the five officers making a total of ten members, and the specification that the annual meeting shall always be held in Chicago.

The annual banquet was held on Wednesday evening. On Thursday afternoon a trip was made to the Field Museum and on Friday a number of the members went to Madison, Wis., for an inspection of the Forest Products Laboratory.

### TIMBER TREATING PLANT OPERATION

Four sessions were held for the presentation of committee reports and individual papers and their discussion. General topics for these four sessions were: Plant Operation and Miscellaneous; Preservatives and Specifications; Ties, Timber, Piling, Crossarms and Wood Block Paving. In addition to the papers abstracted below the program included a number of papers and committee reports of general interest to railway men which are briefly mentioned.

The committee on Plant Operation, composed of H. M. Rollins (Gulfport Creosoting Company, chairman; C. D. Batson (Republic Creosoting Company); F. H. Stewart (Central of Georgia), and A. M. Smith (Ayer & Lord Tie Company), presented a list representing standards of practice in plant

operation. This included statements of the methods of determining the amount of oil injected, the specific gravity of creosote, the fractionation of creosote, the preparation of zinc chloride and the proper seasoning of the various classes of timber before treatment.

The recommendation in the committee's report that a minimum of one-half pound of zinc chloride be injected per cubic foot of timber aroused considerable discussion. F. D. Mattos (Southern Pacific) stated that the Southern Pacific secures 10 years of life from timber treated with from 0.25 to 0.3 lb. of zinc chloride per cubic foot of timber using a two and one-half per cent solution and treating to refusal. The timber used is mainly Douglas fir with 85 per cent heart wood. The Atchison, Topeka & Santa Fe injects 0.4 lb. of zinc chloride per cubic foot of timber, using a 3.5 per cent solution for long leaf yellow pine. The Chicago & North Western injects 0.5 lb. of zinc chloride per cubic foot. This road recently inspected one lot of ties after nine years of service, and found that 98 per cent were still in the track. An analysis showed that these ties still contained .23 lb. of zinc chloride per cubic foot of timber. They had been treated by the Wellhouse process. It was the consensus of opinion that the amount of zinc chloride used should depend upon the class of timber being treated and the section of the country where it was used.

Several members reported that they had had trouble with wooden tanks lined with lead for holding concentrated solutions of zinc chloride. Steel tanks were reported as giving satisfactory service at several plants where they had been painted inside with coal tar. J. B. Card stated that he had found paint unnecessary. Zinc chloride attacks steel only when it is heated, and if some spelter is placed in the bottom of the tank the action is concentrated on the spelter leaving the steel immune.

The "Economical Use of Steam in Connection with Wood Preserving Plants" was discussed by A. M. Lockett, president, A. M. Lockett & Co., New Orleans, La. This paper called attention to the desirability of paying some attention to the steam economy in a plant, which in many cases will increase the output and reduce the cost per unit. He suggested a number of practical methods of increasing steam economy, some of which are not generally practiced in wood preserving plants. All steam pipes should be covered by a suitable non-conductor and radiation from the retorts should be reduced in the same way. By the use of an ample quantity of water to condense the vapor in a retort after the steam is blown down, a material saving in the steam required to operate the vacuum pump can be effected, as in this way the pump is not required to bail out the steam and vapor by actual displacement. Steam traps should be used on all heating coils; live steam should never be used for heating oil in tanks or for heating the plant and offices when exhaust steam can be secured from air compressors, pumps or engines. The water supply used in the condenser need not be elevated to the storage tank if a low service pump is operated in connection with the condenser in starting; long steam lines supplying hoisting engines in the yard must be very carefully insulated; the condition of all pumps must be carefully watched to economize steam; by the use of a storage tank for feed water, exhaust steam can be used for heating it when available.

A series of experiments for determining the temperature changes in wood under treatment was described by George M. Hunt, chemist in forest products, Forest Products Laboratory, Madison, Wis. The tests were made on sawed maple, red oak, loblolly pine and hemlock ties, representing ring-porous and diffuse-porous hardwoods and slightly resinous and highly resinous conifers. The treatments were made in



the laboratory cylinder, 3½ ft. wide by 11 ft. long, the heat being applied by saturated steam at atmospheric pressure, saturated steam at 20 lb. pressure and hot creosote at atmospheric pressure. The heating was continued until the rise in temperature, as shown by a thermometer, inserted in a 1¼ in. hole 26 in. long along the axis of the tie, was not more than 1.8 deg. F. in 10 minutes. At the conclusion of the heating period the vacuum of 26 in. was applied for one hour. These tests showed that during the first 30 or 40 min. heating there was very little rise in the temperature in the interior of the tie. After the heat penetrated through the interior a steady rise in temperature began, most rapid at first and gradually becoming slower, but in no case reaching the temperature of the heating medium. The average time required to bring the ties to a temperature of 212 deg. F. was 4 hr. 20 min. with the 20-lb. steam treatment. The rate of increase of the interior temperature was greatest with this treatment and least with the creosote.

### TREATMENT OF RED OAK TIES

The committee on Miscellaneous Subjects, composed of J. H. Waterman (Chicago, Burlington & Quincy), chairman; M. K. Trumbull (National Lumber & Creosoting Company), A. G. MacIntyre (McGill University) and S. B. Lindley (Western Wood Preserving Company), presented a discussion of the treatment of red oak ties. A list of questions was sent to the membership and from the replies to these questions the following conclusions were drawn:

- 1.—Red oak ties can be treated satisfactorily, when air seasoned for ten months, if the summer months are included.
- 2.—Red oak ties may be treated satisfactorily when air seasoned for six months, provided artificial seasoning is employed as an adjunct.
- 3.—For practical reasons the period of seasoning should govern, in determining whether red oak ties are ripe for treatment: If a boring test is used, the core withdrawn with an increment borer should appear dry for a depth of two inches; if weight is used, the weight per cubic foot should not exceed 52 lb.; if moisture determination is resorted to, a test should indicate not to exceed 22 per cent of moisture in the ties.
- 4.—Artificial seasoning of red oak ties apparently has not been sufficiently developed to justify a conclusion from the replies.

The committee did not feel, however, that the above conclusions were satisfactory, and therefore, drew up the following list, which they felt would better represent the judgment of the members and the practice of the association.

- 1.—Red oak ties should be air seasoned for at least one year before attempting to treat them.
- 2.—It is practically impossible to season a red oak tie so as to render it dry throughout.
- 3.—For practical reasons the period of seasoning, to determine whether red oak ties are ripe for treatment, should govern.
- 4.—Artificial seasoning of red oak ties fails to give the desired result.
- 5.—Penetration of the heart wood of red oak ties can be secured practically with the same success as in the sap wood.
- 6.—The use of an increment borer in determining the penetration of an antiseptic treatment in red oak ties fails to give conclusive results. A tie showing insufficient penetration when inspecting the core which is withdrawn by an increment borer, will in the majority of cases show satisfactory penetration when the tie is sawed and then split.
- 7.—Red oak ties may be treated satisfactorily with any standard process.

L. B. Moses reported the results of a test conducted at Madison, Ill., in which eight red oak ties were weighed monthly, beginning in February, and showed the greatest seasoning at the end of six months. Another member stated that in Arkansas it was necessary to season red oak ties one entire summer regardless of the time of cutting.

C. M. Taylor (Philadelphia & Reading) read a paper advocating cutting off the ends of ties and piling not bored or adzed, to be sure that there was no internal rot, this being particularly necessary with pine. The idea was heartily approved by the convention.

The Committee on Preservatives and Specifications presented a report consisting of a review of the specifications for materials previously adopted by the association. In discussing the report E. B. Fuls, of the American Tar Products Company, con-

demned the present hysteria regarding the present shortage of creosote, stating that although all the nations at war had placed an embargo on the exportation of creosote when the hostilities began, this embargo has since been raised from all countries except Germany, and only 15 per cent of our creosote comes from Germany. Seven cargoes of oil have been imported into this country since the war began. The present difficulty is lack of boats and it is expected that in a few months these conditions will be normal except for the embargo on German oil, as the American producers are making increases in domestic production which will offset the German shortage. S. R. Church, of the Barrett Manufacturing Company, stated that a revival of the steel industry will increase the production of coal tar from which more creosote can be produced.

### TOXICITY OF CREOSOTE FOR MARINE BORER

Experiments to determine the comparative toxicity of creosote and its constituents for the marine wood borer, xylotrya, were described by L. F. Shackell, M.D., assistant professor of pharmacology, St. Louis University School of Medicine. The creosote used was distilled from coal tar between the temperature limits of 0 deg. and 400 deg. C. The characters of the fractions distilled from this creosote, as shown by the Forest Service reports, are as follows:

Fraction 1—Light oils .....	Up to 205 deg. C.
Fraction 2—Naphthalene solids .....	205 deg. to 250 deg. C.
Fraction 3—Deal oil or golden oil.....	250 deg. to 295 deg. C.
Fraction 4—Anthracene solids .....	295 deg. to 320 deg. C.
Fraction 5—Residue .....	Above 320 deg. C.

A series of tests made with 1 per cent gum arabic emulsions of the creosote and of each fraction tested showed fraction 1 to have the greatest toxicity and the others to stand in the following order: Fraction 2, fraction 3 and creosote practically equal, fraction 4 and fraction 5. Experiments with undiluted aqueous extracts of creosote and of fractions 1 and 5 showed the same order of toxicity obtained as with the emulsions. The high toxicity of fraction 1 in connection with the present published observations of C. H. Teesdale, who found that experimental piling treated with 18 lb. of fraction 1 per cu. ft. lost practically 35 per cent of the oil by volatilization in two months and were severely attacked by the borers in 13 months, led to experiments to determine to what extent the loss of the more volatile constituents would affect the toxicity of creosote and its fractions. These tests showed that the volatilization of fraction 1 definitely lessened its toxicity and similar, although less noticeable, results were secured with the residue and with fraction 3. Addition tests showed that the light oils of creosote, such as benzene and its congeners, are very toxic for xylotrya, that naphthalene and anthracene are only very slightly, if at all, toxic and that the tar acids are toxic in varying degrees. One of these, alphanaphthol, which is highly toxic, is manufactured at relatively low cost from the abundant but practically non-toxic naphthalene.

Clyde Teesdale (Forest Products Laboratory) stated that tests made at the Forest Products Laboratory showed that the toxicity was exactly reversed from that reported by Dr. Shackell, and that in the tests fraction 1 apparently lost toxicity, while fraction 3 retained it indefinitely.

### ANNUAL CHARGES FOR TIES

A paper by Harrington Emerson and T. T. Bower discussed a "Method for Finding the Annual Charges for Ties." The various assumptions upon which the investment in ties could be charged off before renewals were discussed and a diagram was presented showing graphically the effect of these various assumptions. A diagram was also included showing the annual charge per tie, the life of the tie and the original cost plotted from the formula

$$A = \frac{C}{Y} + C(I + T)$$

in which A equals the annual maintenance charge and C the first cost of the tie and track, Y the average life, I the rate

of interest on the investment and T the tax rate on the investment. In discussing methods to reduce the annual expense for ties the following five rules were suggested:

Buy the ties carefully.

Spend all on protection that the gain in life justifies.

Use them at once.

Do not take them out before they are used up.

Assort them for proper use.

It was stated that careful buying insures a price reduction of about 10 per cent and a quality increase of about 20 per cent. To allow ties to lie for two years before placing in the track adds about \$0.14 to the first cost.

#### LIFE OF TREATED TIES

J. H. Waterman, superintendent of timber preservation, Chicago, Burlington & Quincy, presented some observations he has made during the past year on the service of treated ties. Out of 550 red oak ties treated with zinc chloride which were placed in the Burlington experimental track near Mystic, S. D., in 1900, 50 were taken out at the last inspection on October 7, 1914, on account of decay. Previous to this time three had been taken out for the laboratory and 18 on account of decay, making a total of 71 removed or a little less than 13 per cent. These ties are laid on a 3 per cent grade and a 12 deg. curve. All gave a life of 12 years, 87 per cent will certainly give 15 years' life and there is reason to believe that 50 per cent will be in track at the end of 18 to 20 years. In the two mile section between Sidney, Neb., and Peetz, Colo., 6,354 ties were laid in the fall of 1900 and the winter of 1900-1901. These ties were also treated with zinc chloride and are laid on a tangent in gravel ballast. Up to and including 1913, 285 of these ties had been removed on account of decay, and at the last inspection on October 6, 1914, 103 additional were removed, making a total of 388. This means that 94 per cent of these ties have already given 14 years service in a dry western climate.

On the Chicago & Eastern Illinois 24,271 red oak ties treated by the Wellhouse process using zinc, glue and tannin, were inserted in 1900 between Cypress, Ill., and Joppa. A count of these ties in June, 1914, showed 18,045, or practically 75 per cent still in the track. Mr. Waterman also reported that he had observed that ties treated with creosote or with a mixture of creosote and zinc chloride show less mechanical wear under the rail than ties treated with zinc alone on account of the action of the oil on the surface which lubricates the tie and the rail and results in less rail cutting and surface wear.

H. E. Horrocks (Pacific Creosoting Company) read a short paper protesting against the conclusions reached in bulletin 101 of the forestry department entitled "Relative Resistance of Various Conifers to Injection with Creosote," in which it was stated that Douglas fir is not suitable for creosote treatment. He cited the success in treating this material for more than 20 years as proof that such treatment is feasible.

Howard Weiss, director of the United States Forest Products Laboratory, took exception to Mr. Horrocks' criticism of bulletin 101.

#### SPECIFICATIONS FOR TREATABLE TIMBER

The committee on specifications for the purchase and preservation of treatable timber, consisting of E. A. Sterling (consulting engineer), chairman; Carl G. Crawford (American Creosoting Company); Hermann von Schrenk (consulting engineer); C. T. Winslow (Forest Products Laboratory); William A. Fisher (A. C. L.); Lowry Smith (N. P.), and A. C. Becker (G. T.) reported on five subjects: A, The Purchase of Treatable Wood; B, Preparing Timber for Treatment; C, Preservatives and General Methods of Application; D, Summary of the Fundamental Principles Underlying Efficient Treatment, and E, Regional Consideration.

Under the first heading they recommended the new grad-

ing rule of the Yellow Pine Manufacturers' Association for yellow pine and the specifications of the American Railway Engineering Association for general requirements. A number of suggested modifications from these specifications were given. With the exception of the requirements as to heart wood, the A. R. E. A. specifications for size, form and manufacture of track ties were approved. Modifications in regard to heart wood and a few other points were included. The A. R. E. A. specifications for piles were approved with the exception of the requirements for sap wood for which suggested modifications were given, particular attention being called to the necessity for selecting piles with a view to the service for which they are required.

Under the second heading a discussion of the best practice in air-seasoning ties and timber was presented, in which it was recommended that hardwood track ties be given a minimum of eight months' seasoning and preferably 12 months; yellow pine seasoned in the south, 4 to 6 months; and hemlock, tamarack and jack pine, 12 months. The use of steaming or boiling was also referred to for artificial seasoning when there is not sufficient time for proper air seasoning. Under the head of preservatives, creosote and zinc chloride were discussed, it being recommended that a full cell treatment with the former be used for piling and marine timbers where subject to the attacks of teredo and other marine borers, in permanent structures not subject to mechanical wear, when conditions of moisture, climate or humidity are favorable to wood-destroying fungi, and particularly where the cost of renewals or replacements would be high. The empty cell creosote treatment was suggested for all track ties used in moist climate or under such conditions that the mechanical life is limited to 11 to 15 years, also for structures of a limited life or subject to superficial mechanical wear and elevated so as to be exposed to the wood-destroying influences of weather conditions. A full impregnation of zinc chloride was recommended for arid and semi-arid regions, particularly on track ties and other material with mechanical life limited to 11 years; also for wood resistant to creosote. It should not be used when mechanical wear is eliminated nor in situations where the treated timber is in permanent or intermittent contact with either stagnant or flowing water.

The summary of fundamental principles included the following: Preservative treatment should be limited to kinds of wood which are not in themselves resistant to decay, thus making timber available which otherwise would be useless and which is obtainable at low cost as compared with durable species. The moisture content of the wood before treatment should be reduced, preferably by air seasoning, to not more than 20 per cent of its oven-dry weight or to a constant weight basis. The efficiency of treatment should be based primarily on the extent of distribution of a stated amount of preservative rather than on the final retention of cubic foot.

#### A SPECIFICATION FOR A COAL TAR CREOSOTE SOLUTION\*

By HERMANN VON SCHRENK AND ALFRED L. KAMMERER  
Consulting Engineers, St. Louis, Mo.

The results of some tests made with mixtures of refined coal tar and creosote were presented last year which indicated that when such mixtures consisted of about 20 per cent coal tar and 80 per cent creosote, an oil was produced which could be successfully used for the impregnation of ties. It was found that such an oil penetrated timber to the same extent as the usual heavy creosote oils, provided the mixture or solution was kept at about 180 deg. F. It was recommended that the mixture be made at the treating plants.

During the past year it has become somewhat difficult to obtain the usual supply of high grade foreign creosotes, and there have been increased inquiries for the mixture of coal tar and

\*By courtesy of the Committee on Wood Preservation, A. R. E. A.



creosote. It was suggested that the solution of the two substances could be more readily achieved at the plants where the creosote was made than at the treating plants, because it was easier to filter the mixture and thereby reduce the carbon percentage. This brought up the question of a specification for the finished product to make it possible for a prospective consumer to buy the mixed oil. In co-operation with the Barrett Manufacturing Company, a number of tests were made by the writers to determine distilling points, specific gravities and viscosities of various mixtures. Several coal-tars were selected and these were mixed in different proportions with various light creosote oils.

As was to have been expected the specific gravities and viscosities gradually rose as the percentage of coal tar was increased. Based on these and similar determinations, the following specification was submitted:

"The oil shall be a pure coal-tar product, consisting only of coal-tar distillates and oils obtained by the filtration of coal tar. It shall contain no admixture of crude tar. Water shall not exceed 2 per cent. Specific gravity at 38 deg. C. shall not be less than 1.06 or more than 1.10. Matter insoluble on hot extraction with benzol shall not exceed 2 per cent. Viscosity (Engler) at 82.3 deg. C. (180 deg. F.) shall not be more than 59 for 200 cc. No variation above 59 seconds shall be allowed. On distillation by the standard method of the A. R. E. A., it shall yield the following fractions, based on dry oil: Not more than 1 per cent at 170 deg. C.; not more than 5 per cent at 210 deg. C.; not more than 30 per cent at 235 deg. C. The residue at 355 deg. C. shall not exceed 26 per cent."

In presenting this specification it should be understood that we regard it by no means final. It is a frank attempt to describe in as few words as possible an oil made up of coal tar creosote, with a certain percentage of coal tar. The writers have had occasion to examine a number of samples purchased under this specification, and found that they came within the prescribed limits. The justification for such a specification lies in the fact that a mixture of the two substances was being prepared for general use and sold in large quantities. This has previously passed more or less as creosote oil. The present specification states in so many words that a mixture is contemplated. It is hoped that the writing of this specification will bring forth suggestions as to improvements.

*Discussion.*—This paper caused a discussion between the advocates of coal tar creosote mixtures and straight creosote. A. L. Kuehn, of the American Creosoting Company, advocated less secrecy in the manufacture of creosote and especially recommended an inspection of the manufacture of creosote by representatives of the railroads or other consumers. The consensus of opinion was that the industry demanded the abandonment of the present secretive attitude of the creosote manufacturers and commercial treating plants.

### THE MECHANICAL LIFE OF TIES AS AFFECTED BY BALLAST

By E. STIMSON

Engineer Maintenance of Way, Baltimore & Ohio, Baltimore, Md.

The wooden cross tie, transmitting the heavy axle loads from the rail to the ballast is subjected to mechanical wear not only from the action of the rail on top of the tie, but also from the action on the sides and bottom of the tie of the ballast which supports it. Tie destruction from mechanical wear of ballast seldom occurs to any appreciable extent excepting in occasional stretches of crushed stone, or other forms of hard ballasted tracks where a soft roadbed or a sink requires continual raising of track and tamping of ties in order to maintain good track surface. The wearing away of ties by ballast is the result of tamping the ballast under the tie and the action of the tamping tool striking the side and edge of the tie rather than the action of the tie bearing upon and working in the ballast under trainloads. There is but little mechanical wear due to the tie working in the ballast.

After ties are first put in the track and tamped to surface on hard ballast, the necessity for retamping to surface and con-

sequently the wear of the ties by ballast depends largely on the nature of the sub-grade. Good surface and sub-surface drainage usually insures a solid road bed where the normal bearing value of the material qualifies it for heavy loading. Where such conditions prevail, track surface is maintained with a minimum amount of tamping and the mechanical effect of the ballast on the ties is negligible.

Ties which are removed after service in hard-ballast tracks are found to be pitted or indented on the bottom and sides from contact with the stone or other material. These indentations are a valuable factor in holding the track in line and surface as long as they are not increased by frequent tamping. The continual tamping of the ballast under the tie soon rounds off the edges of the ties, leaving little or no flat bearing surface for support. When this happens the tie acts as a wedge and tends to force the ballast out into the cribs instead of receiving full support from it. The greatest wear occurs from 6 to 8 in. either side of the rail and there is practically none directly under the rail. In track maintenance the best practice is to tamp the tie for its full bearing upon the ballast outside of the rail and for an equal distance inside. In spite of close supervision, however, this is not always done but instead, the trackman expends his efforts toward tamping solidly as near the rail as he can work with a tamping pick. This wears off the edge of the tie for some distance each side of the rail and leaves a short unworn edge directly under the rail. When a tie becomes rounded on the bottom at the most essential tamping point and becomes difficult to maintain to surface, it is then found more economical to replace it with a new tie having a flat bottom that will necessitate less tamping. The average trackman feels little hesitancy about removing a tie for this cause when he has difficulty in keeping it tamped. Even in cases of most excessive tamping, wear from ballast does not become objectionable until the tie has been in service from 50 to 75 per cent of its normal life. The kinds of ballast and ties used and the standard at which a track is maintained, are all important factors. Slag and stone when crushed, form hard, sharp, angular fragments that appear from observation, to be more destructive when tamped under wooden ties than gravel, burnt clay, cinders, granulated slag or other similar forms of ballast. Ballast of the last named materials has little or no effect in wearing down the sides and bottoms of the ties nor is the tamping of this kind of ballast so destructive to the ties, as the particles are smaller, generally of softer material and rounded in form. There is a perceptible difference in the resistance offered against mechanical wear by ties made from the different kinds of wood. Hard wood ties of rough texture withstand the action of the rail cutting and of excessive tamping much longer than ties of soft wood. It has been observed that these ties which are most durable under the mechanical wear of the rail also last longer under the wear of ballast; for instance—white oak, chestnut oak, black walnut, maple and beech are more suitable than yellow pine, fir, catalpa, cedar and red wood.

It is important to mention the extent to which some forms of ballast increase the abrasive action of the rail upon the tie. Granulated slag, gravel, cinders, chatts and other forms of ballast carrying fine gritty particles contribute largely to this action between the rail and the tie or between the tie plate and the tie thus greatly accelerating the mechanical wearing away of the wood. It has been observed that the cutting of the rail into the tie is much greater where fine ballast is used than where coarse hard ballast is employed. This trouble has been largely overcome by the use of flanged bottom plates which become embedded in the tie, and by plates fastened directly to the ties by lag screws, independent of the rail spiking, thus reducing the movement between the plate and tie to a minimum. However, many ties are removed from track each year because of deterioration from rail wear and a large amount of this deterioration can be assigned to the effect of the fine particles of ballast grinding under the rail.

Regarding the use of treated ties where extraordinary wear by ballast is known to exist; the same rule might apply that is observed when the mechanical wear under the rail limits the life of the tie. Treatment to prevent decay does not give the tie in-

creased resistance to abrasion, and ballast abrasion that is so severe as to wear out an untreated tie would preclude the possibility of any benefit from the use of treated ties at locations where such abrasion occurs.

### AIR SEASONING OF CROSS TIES

By A. H. NOYES

Ayer & Lord Tie Company, Chicago

The ever increasing shortage of oak timber of all species makes the adoption of softwoods for ties a necessity. As the character of this timber requires careful handling to insure the delivery of sound material to the treating plant, and thereby a serviceable tie to the consuming road, the proper methods of handling such ties, particularly of beech and gum, are worthy of consideration.

Owing to the structure of the timber, beech ties are nearly always sawed. They are too hard to hew, and on seasoning, get rough or scaly. On the other hand, gum timber hews easily and makes a smooth, pretty tie. When gum or beech ties are produced tributary to a railroad, it is advisable that they be shipped into the treating plant as promptly as possible, after being made, and seasoned at the plant in preference to seasoning on the line of the road, as, in this event, the ties can be stacked for seasoning under more satisfactory conditions, and can be loaded for treatment at the proper time; in fact, the entire process kept under more complete supervision and control than under other conditions and in this manner avoid the possibility of damaged timber reaching the treating plant.

It is an accepted fact that all ties, softwood especially, should be carefully piled, never on the ground, but on sound stringers, and either with spacing strips between layers, or that they be piled so that the faces do not have full bearing against each other, as experience has shown that ties piled too close soon show damage.

Experience on river territories shows that it is not safe to buy softwood ties while the sap is up, no matter how carefully the ties are piled for proper seasoning, as transportation during the summer is not to be counted on with any amount of security and ties are liable to be damaged before they are loaded for shipment. Besides this, softwood ties piled on river landings are, in some cases, in deep shade, or, where in the open, are frequently surrounded with a rank growth of weeds, that tends to hold the moisture, creating conditions favorable to rapid damage. For this reason, the practice of buying softwood ties at small landings should be avoided, and ties should be hauled to such landings only where they are handled in large quantities, where the timber will be exposed to sunlight and free air currents, where landings are free from weed growths and where shipments can be made by date rather than by appearance of the timber.

### SILL TIES

By F. J. ANGIER

Superintendent Timber Preservation, Baltimore & Ohio, Baltimore, Md.

Seasoning conditions in tie storage yards vary considerably. One yard may be nicely drained and ballasted, another may harbor conditions which are conducive to the decay of timber. It is fair to assume that there can be found in all tie yards more or less decayed timber, and, generally speaking, this decayed timber will be in direct contact with the ground. To reduce this useless waste of good material ties should be seasoned on sills that will not decay. These sills may be of wood chemically preserved, or they may be of concrete.

To compare the cost of the various kinds of sill ties, the following data has been prepared for the tie storage yard of the Baltimore & Ohio at Green Spring, W. Va. The present trackage provides for the storage of approximately 600,000 ties. This is calculated on a basis of cribbing ties in lots of 100, making four cribs to a pile and 1,500 piles. This will require 12,000 sill ties to season the maximum number of 600,000 ties. Every sill tie is in direct contact with the ground.

Approximately 75 per cent of all ties received for treatment at this plant are purchased as No. 1 and 25 per cent as No. 2 ties. The cost varies in different localities, but we can assume that the average price paid for No. 1 ties is 60c and for No. 2 ties 40c. We believe it conservative to say that 10 per cent of the untreated sill ties check or are damaged to such an extent that they can be used only as No. 2 ties and 2 per cent of all sill ties are broken or decayed to render them practically worthless. Using the above estimate as a basis, we may obtain the following comparisons:

#### Cost of Untreated Sills

10% of No. 1 ties, or 900, are made No. 2 at a loss of 20c each.	\$ 180.00
2% of all sill ties are made worthless.	
180 No. 1 @ 60c each.....	108.00
60 No. 2 @ 40c each.....	24.00
Labor of turning over 12,000 sill ties and cleaning for treatment at 1/2c each.....	60.00
Restacking yard for locating sill ties.....	30.00
Disposing of worthless ties.....	6.00
<b>Cost for six months.....</b>	<b>\$ 408.00</b>
<b>Cost for one year.....</b>	<b>\$ 816.00</b>
Interest and taxes one year on 12,000 sill ties (\$6,600.00 @ 7%).....	462.00
<b>Total cost for one year.....</b>	<b>\$1278.00</b>
Or, per sill per year.....	0.1065

#### Cost of Treated Sills

No. 2 ties each.....	\$0.40
Cost of treating and laying.....	0.18
	<b>\$0.58</b>
Interest and taxes (6% plus 1%).....	\$0.0406
Renewal cost (assuming 20 years life).....	0.0290
<b>Annual cost per sill.....</b>	<b>\$0.0696</b>
<b>Total cost for one year.....</b>	<b>\$835.20</b>

#### Cost of Concrete Sills

12,000 at an estimated cost of 80c each.....	\$9,600.00
Labor, installing.....	300.00
<b>Total cost 12,000 sills.....</b>	<b>\$9,900.00</b>
Cost per sill.....	0.825
Interest and taxes (6% plus 1%).....	\$ 0.05775
Renewal cost (25 years' life).....	0.03300
<b>Annual cost per sill.....</b>	<b>\$ 0.09075</b>
<b>Annual cost (12,000 sills).....</b>	<b>\$1,089.00</b>

These estimates show an annual saving in using treated sills over untreated of \$443.00, and over concrete of \$252.00. The cost of concrete sills may vary, but the estimate shown above is believed to be conservative.

An indirect saving should be credited to the treated and concrete sills on account of the following: (a) no infection of sound ties from contact with decaying untreated sill ties; (b) less injury to valves and pumps by cinders and other foreign matter carried into the retorts on ties that have been in contact with the ground, and (c) untreated sill ties that have been in contact with the ground are not as well seasoned as other ties in the same pile; therefore, when loaded in same charge they may be under-treated and their life shortened.

The cost of ties and their treatment will vary. Some plants may use cull ties, which cost practically nothing. The Baltimore & Ohio will not purchase cull ties at any price; and, therefore, sill ties must be made from the ties in stock, and these must be charged to stock account at the prices paid.

### DESTRUCTION OF TIMBER BY MARINE BORERS

By E. S. CHRISTIAN

General Manager, Norfolk Creosoting Company, Norfolk, Va.

It is conceded that marine borers do not thrive in foul water, and that they prefer the uncontaminated water of the ocean, hence, Hampton Roads, which is an arm of the Atlantic, offers an ideal environment for the growth of the teredo and its kindred borers. I have frequently seen specimens of xylotrya and other teredo, 3 ft. long and 5/8 in. in diameter, although the more destructive borer is much smaller and by far more numerous.

In this connection, the history of the Chesapeake & Ohio pier No. 6, formerly No. 1, at Newport News, Va., on Hampton Roads, just below the mouth of the James river, is interesting, not only because it tells the story of how timber treated with 12 lb. of dead oil per cu. ft. has withstood the attacks of marine borers for



32 years, but it also relates that in these same waters timber not creosoted was destroyed in two years. This pier is 800 ft. long and 200 ft. wide, requiring about 4,000 piles. It was first built in 1879 on charred pine and cypress piles. Charring at that time was thought to make timber immune from all marine borers, but upon examination one year later the piles were found to be damaged to such an extent as to make the pier unsafe. After wasting much time and money experimenting with patented substitutes, a contract was entered into with E. R. Andrews, of Boston, a protege of the Bethels, of Becton, England, to move his experimental creosoting plant from Boston to Money Point and to supervise the construction of a new plant at that place. This plant was completed in the early autumn of 1882 and the first creosoted piles used on the Atlantic coast were treated there and used in rebuilding this pier in October of the same year, the construction being completed in February, 1883.

The writer was appointed inspector on that work, probably for the same reason that many young men are now appointed, but he obeyed his orders, which were to see, as far as possible, that every cubic foot of each of the 4,000 piles absorbed 12 lb. of oil. One of the tests made to determine this was to bore each pile in six places and if any boring showed a penetration of less than  $1\frac{1}{2}$  in., the pile was rejected and treated again.

The oil was bought by the railroad company under the following specifications: "It must be distilled from the coal tar derived from Newcastle coal, and must be of a greenish yellow color when liquefied. It shall not contain any water, not over 8 per cent of tar acids, not less than 60 per cent of naphthalene, not less than 20 per cent of anthracene and anthracene oil. Not less than 5 per cent shall remain in the flask after it has been heated to a temperature of 320 deg. C."

This pier is today in daily use as one of the 14 units which comprise the terminals of this road at Newport News, 32 years after it was rebuilt on creosoted piles.

Analysis of test pieces of a pile taken from this pier in 1912 showed that after 30 years' service, there remained  $10\frac{1}{2}$  of the original 12 lb. of oil, and of this quantity, 55 per cent was naphthalene. All of these pieces were taken from the pile between the high water and the mud lines.

I have recommended 16 lb. of oil per cu. ft. for marine work in Hampton Roads because of the difficulty in obtaining oil with more than 35 per cent of naphthalene. I know that I am at variance with a great deal of expert opinion, but my experience tells me that I am right. I believe, however, that in the treatment of cross ties and bridge timbers, the naphthalene fraction may be lowered providing that the percentage of pitch is increased. It is well to note that piles not creosoted, when used in Hampton Roads or its adjacent waters, will be destroyed by marine insects in two years. I have known of untreated piles driven in April near the Virginian Railway piers, to be entirely destroyed at the low water mark by the following September. It is, however, a well known fact that the destructiveness of the teredo will vary from one year to another.

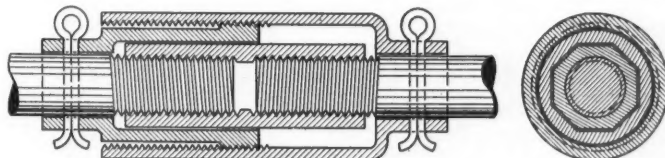
An illustration of the value of timber treated with oil containing over 50 per cent of naphthalene, is found in the Manatee river bridge on the west coast of Florida, built by the Seaboard Air Line in 1900. The chief engineer consulted me as to the advisability of using creosoted piles, and at the same time warned me that the Government engineer in command in that district who had had a great deal of experience in the use of creosoted timber on the west coast, advised against using it and stated that it would not last three years. Knowing, however, that his experience was based entirely on long leaf pine indifferently treated, I assured Col. Gwathmey that sap pine treated with 25 lb. of oil per cu. ft. would stand, and now, after 14 years, I am told that these piles are in perfect condition.

#### CLOSING BUSINESS

It was decided to hold the next annual meeting, beginning the third Tuesday in January, 1916, at Chicago.

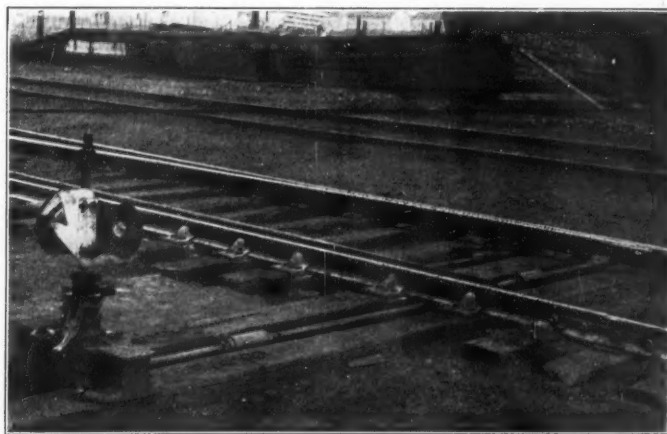
## A NEW TURNBUCKLE FOR SWITCH ADJUSTMENT

One of the minor but nevertheless important details of track work is the maintenance of the proper head and switch rod adjustments. To simplify this work, The Hardick Locked & Covered Turnbuckle Company, 14 East Jackson boulevard, Chicago, has devised a turnbuckle for insertion in these rods by the use of which it is claimed that the attention required will be materially reduced. This device consists of a long octagonal nut or turnbuckle proper enclosed in two separate casings, making three distinct parts. The inner bore of the inside casing



A Cross Section of the Hardick Locked and Covered Turnbuckle

is also octagonal to engage the nut or turnbuckle while the outer casing or sleeve is threaded on the inside to correspond with the outside surface of the inner casing. Both sleeves are also slotted at the ends to permit cotter pins to pass through the casings and the rod, locking them into one unit. In this way the turnbuckle is encased to protect it from corrosion. To adjust the turnbuckle, the cotter pins are removed, the outer casing unscrewed from the inner one, the casings pushed back out of position and the turnbuckle adjustment made in the ordinary manner. The outer end of each casing is hexagonal in shape to permit the use of a wrench if desired. As small an adjustment as  $1/48$  in. can be secured. To further simplify the switch con-



A Head Rod on the G. R. & I. Equipped with the Hardick Locked and Covered Turnbuckle

nections, the switch and head rods are made in one piece, having simple connections with the switch rails, which reduces the number of bolts and the connections ordinarily required.

One of these turnbuckles was removed from a track of the Grand Rapids & Indiana at Grand Rapids, Mich., after 14 months and although the outer casing was marred, showing that it had been struck by picks in cleaning ice and snow from the track, the threads on the inside showed no deterioration and the oil which was put on at its installation was still evident. The accompanying photograph shows a complete head rod which has now been in service on the same road for four months.

**RAILWAY GATES AT ANTWERP TO BE MADE INTO SHELLS.**—According to reports, the German authorities have taken the great bronze gates of the Central Railway station at Antwerp in order to make ammunition.

# General News Department

The Missouri Bankers' Association has appointed a special committee to study conditions affecting the Missouri railroads.

Telegraph operators and station agents on the Texas & Pacific have filed a demand with the management for an increase of 15 per cent in pay and certain changes in working conditions.

The Snoqualmie tunnel through the Cascade mountains on the Chicago, Milwaukee & St. Paul, was formally opened for traffic on January 15, and the transcontinental passenger trains, the Olympian and the Columbian, passed through the tunnel on that day.

Two bills have been introduced in the legislature of New York to repeal the full crew law, which was passed in 1913. This is the law concerning which a copy of a letter was published in the newspapers wherein William Sulzer, afterward elected governor virtually promised beforehand to give the act his approval.

The new electric interlocking plant at Aulon, Tenn., near Memphis, at the crossing of the Nashville, Chattanooga & St. Louis, the Louisville & Nashville and the Illinois Central was put in service this week. In connection with the interlocking an "automatic flagman," made by the L. S. Brach Supply Company, of New York, was installed at the Poplar Boulevard grade crossing.

A bill has been introduced in Congress by Mr. Goeke, of Ohio, H. R. No. 17,894, to amend the Boiler Inspection Act of February 17, 1911, so as to provide for the inspection by government inspectors of all parts of the locomotive and tender; and it has been passed by the House. A law of this nature was recommended by the Interstate Commerce Commission. In the Senate the bill was referred to the committee on interstate commerce.

The New York State Public Service Commission announces the conclusion of an agreement for the purchase of the easement under the property of the New York Central, at the northwest corner of Lexington avenue and Forty-second street, New York. This easement is required for the construction of the diagonal subway which is to connect the existing subway in Park avenue with the new subway in Lexington avenue. The consideration for the grant is \$902,500, of which \$500,000 is for the easement, and the remainder for the construction of the subway underneath the New York Central property. This part of the new subway is to be finished in about three years.

The Farmers' Union has given out a signed statement by President W. D. Lewis and Peter Radford, national lecturer, urging opposition to the passage of a full crew law by the Texas legislature. The article says "there is no payroll in civilization that does not rest upon the back of the farmer. He must pay the bills all of them." The article goes on to argue that the farmer in the long run pays a large part of the expenses of the railroads, including any unnecessary expenditures, whether caused by laws or by errors of the management. The full crew law is cited as an example of one of the unnecessary expenses which have been saddled on the railroad managements in various states.

The question when the Grand Trunk Pacific shall begin operation of the National Transcontinental Railway, the new Canadian line between Winnipeg and the Atlantic seaboard, has been under discussion between the government and the officers of the Grand Trunk during the past week, but it is said that no agreement has been reached. The road was mostly finished last autumn, and it is said that, according to the contract, the G. T. P. should have begun its operation on November 1. It is believed that the railroad officers are demanding a change in the terms of the contract, on the ground that the exorbitant cost of the new line has made a capital charge which will be greater than the traffic of the line can be made to pay.

Charles S. Whitman, the new Republican Governor of New York, has endorsed a proposition to consolidate the two public service commissions of the state and to reduce the salaries of

the members from the present rate of \$15,000 a year. A bill has been introduced in the legislature by Mr. Green of Kings county, designed to effect the proposed consolidation. Mr. Green would have the commission consist of an electrical engineer, a civil engineer, a "practical" railroad engineer, two attorneys experienced respectively in corporation and financial law, and two business men. Three members of the proposed new commission would be chosen from the political party casting the second highest number of votes at the last election. The terms of office would be reduced from five to two years.

A "Square Deal to Railroads" meeting was held by the Springfield Club of Springfield, Mo., on Friday, January 15, which was attended by 300 members of the civic and commercial organizations of the city and officers and employees of the railroads running through Springfield. All three of the receivers of the St. Louis & San Francisco, J. W. Lusk, W. C. Nixon and W. B. Biddle, were present, while the Missouri Pacific was represented by E. J. Pearson, vice-president, and Alexander Robertson, assistant to the president. Short speeches were made by these and other railroad men, by officers and members of the Springfield Club, and by W. C. Turner, vice-president of the Order of Railway Conductors; and the keynote of the entire meeting, as indicated in the speeches, was that under present legislative regulation the railroads are unable to make a reasonable profit, that in the prosperity of the carriers is bound up the prosperity of the American people, and that the best interests of both will be served by a more liberal treatment of the railroads. H. B. Hornsby, vice-president and general manager of the United Iron Works, was chairman of the committee in charge of the dinner.

## Efficiency; the Very Latest

At Sayre, Pa., an important division terminal of the Lehigh Valley, a stranger, whiling away a half hour in a moving picture house, was surprised, following a western photo drama, to see thrown on the screen an announcement like this:

"James Brown, Thomas Jones, William White and John Black boarded for 10 p. m."

This announcement apparently did not cause the least ripple of curiosity in the house, unless it was on the part of the visitor. The men named were members of a freight train crew. The division superintendent at Sayre has made an arrangement with the moving picture theatre men so that freight crews can be called on their screens at any time. Thus the men can amuse themselves when they are in Sayre without fear of causing trouble for the call boys.

## Proposed Additional Accident Statistics

The Interstate Commerce Commission has issued a tentative draft of revised rules governing monthly reports of railway accidents, and at Washington, last Monday, held a hearing to receive criticisms and suggestions. The forms prescribed for use in giving the details of individual accidents have been rearranged, calling for additional details; and there are three new forms: one for locomotive accidents, another for "non-train" accidents and a third for reporting cases where persons reported injured have subsequently died. The term "train accident" is amplified to include all accidents to persons happening in connection with the movement of cars or engines. Industrial accidents, so-called, which now are reported only in a single item, giving the total for the month, will have to be reported in detail, like those more closely connected with train operation. Each monthly statement must include a summary of train accidents compared on the basis of locomotive miles and a summary of industrial accidents compared on the basis of man-hours of employees. No general summary is required; the commission will attend to that in its own offices.

In place of the present four-page sheet of instruction, there is a pamphlet of 16 pages. Persons involved in accidents, whether causing accidents or injured by them, must be de-



scribed so that the statistician at Washington can assign them to the right one of 80 classes; 68 classes for employees, 1 for employees not on duty and the other 11 for passengers and outsiders. Accidents to men in shops, etc., are to be divided into 12 classes, according to causes and the injury to the person,

### Operating Revenues and Expenses of Express Companies for September

The following statement, which is subject to revision, has been compiled by the Interstate Commerce Commission from the monthly reports of operating revenues and expenses of the

A—FOR THE MONTH OF SEPTEMBER										
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered.....	44,812	38,445	73,475	61,213	9,677	7,080	2,840	2,840	9,569	9,278
Charges for transportation.....	\$3,022,451	\$3,089,673	\$4,169,588	\$3,896,043	\$296,134	\$348,353	\$76,277	\$77,767	\$279,711	\$314,926
Express privileges—Dr. ....	1,620,252	1,639,918	2,068,054	1,921,039	150,184	159,542	39,176	38,715	170,115	191,268
Operations other than transportation...	42,804	30,014	213,682	188,263	5,187	13,018	874	951	5,147	4,620
Total operating revenues.....	1,445,003	1,479,769	2,315,217	2,163,267	151,137	201,329	39,975	40,003	114,743	128,278
Operating expenses.....	1,571,648	1,410,145	2,135,381	1,993,410	132,607	152,808	31,428	32,937	92,402	92,103
Net operating revenue.....	* 126,644	69,624	179,835	169,856	18,529	49,021	8,547	7,066	22,341	36,175
Uncollectible revenue from transport'n.	648	.....	276	.....	.....	.....	.....	.....	.....	.....
Express taxes.....	18,101	16,538	35,966	30,450	4,000	2,850	1,100	1,200	4,069	4,181
Operating income.....	† 145,394	53,085	143,591	139,405	14,529	46,171	7,447	5,866	18,271	31,993
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named †	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Mileage of all lines covered.....	8,118	8,080	34,680	33,527	112,117	99,467	5,174	5,009	300,461	297,889
Charges for transportation.....	\$251,322	\$302,321	\$1,039,851	\$1,165,769	\$3,186,755	\$2,808,338	\$100,469	\$112,015	\$12,424,592	\$13,920,638
Express privileges—Dr. ....	136,252	162,347	529,493	592,334	1,634,057	1,399,845	54,191	64,120	6,401,777	7,095,442
Operations other than transportation...	3,824	3,752	26,313	26,902	56,677	53,174	3,388	2,357	357,901	349,383
Total operating revenues.....	118,894	143,726	536,702	600,337	1,609,375	1,461,668	49,667	50,251	6,380,716	7,174,578
Operating expenses.....	92,643	95,822	522,158	531,868	1,530,872	1,285,668	53,074	52,830	6,162,217	6,538,998
Net operating revenue.....	26,251	47,903	14,543	68,468	78,502	175,999	* 3,407	* 2,578	218,499	635,580
Uncollectible revenue from transport'n.	2	1	10	18	453	.....	1,245	.....	1,396	19
Express taxes.....	5,000	4,500	15,075	14,265	36,885	33,000	1,425	789	121,323	116,677
Operating income.....	21,249	43,401	† 542	54,164	41,163	142,999	† 4,537	† 3,368	95,779	518,882
B—FOR THE THREE MONTHS ENDING WITH SEPTEMBER										
Item	Adams Express Co.		American Express Co.		Canadian Express Co.		Globe Express Co.		Great Northern Express Co.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation.....	\$8,676,229	\$8,721,325	\$12,004,228	\$11,036,279	\$906,213	\$946,750	\$231,487	\$223,325	\$943,484	\$957,275
Express privileges—Dr. ....	4,480,512	4,488,199	5,971,900	5,470,523	461,035	443,656	115,736	111,501	572,021	580,870
Operations other than transportation...	133,481	90,497	570,055	564,572	15,824	31,887	2,476	2,700	14,966	13,718
Total operating revenues.....	4,329,198	4,323,623	6,602,382	6,130,328	461,001	534,982	118,227	114,524	386,430	390,122
Operating expenses.....	4,607,975	4,242,160	6,560,282	5,942,783	415,423	444,472	92,586	96,147	278,629	279,169
Net operating revenue.....	* 273,776	81,463	42,100	187,544	45,578	90,509	25,640	18,377	107,800	110,953
Uncollectible revenue from transport'n.	1,361	.....	387	.....	.....	.....	.....	.....	.....	.....
Express taxes.....	53,103	48,233	110,021	93,995	12,000	8,450	3,300	3,600	12,928	12,609
Operating income.....	† 333,242	33,229	† 68,308	93,548	33,578	62,059	22,340	14,777	94,872	98,343
Item	Northern Express Co.		Southern Express Co.		Wells Fargo & Co.		Western Express Co.		Total for all companies named †	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
Charges for transportation.....	\$852,284	\$960,116	\$3,182,631	\$3,299,264	\$9,571,210	\$8,209,973	\$308,069	\$343,931	\$36,675,838	\$39,969,613
Express privileges—Dr. ....	454,658	512,853	1,622,811	1,680,916	4,916,631	4,100,086	165,874	189,232	18,761,182	20,229,058
Operations other than transportation...	10,425	10,391	72,684	72,003	176,736	166,898	9,068	7,220	1,005,719	1,039,769
Total operating revenues.....	408,051	457,653	1,632,504	1,690,351	4,631,315	4,276,785	151,264	161,920	18,920,375	20,780,324
Operating expenses.....	286,190	292,626	1,572,285	1,592,262	4,556,737	3,816,573	162,096	151,740	18,532,266	19,533,511
Net operating revenue.....	121,861	165,027	60,218	98,069	274,517	460,211	* 10,832	10,179	358,102	1,246,813
Uncollectible revenue from transport'n.	32	9	10	26	1,169	.....	30	.....	2,992	35
Express taxes.....	15,000	13,500	44,665	41,638	111,332	96,000	3,380	2,344	366,132	350,028
Operating income.....	106,326	151,518	15,543	56,414	161,615	364,211	† 14,243	7,835	18,984	896,749

\* Indicates deficit. † Indicates loss. ‡ Includes previous year's returns of United States Express Co.

which must be reported in detail. For example, paragraph 38 says:

"In reporting any nontrain accident, the accident should be clearly described and the cause shown wherever practicable. In case of any permanent injury to arm or hand, state whether right or left arm or hand; in case of loss of any part, state exact extent, as, e. g., tip of index finger on right hand, two middle fingers to second joint on left hand, right arm to elbow, loss of sight in right eye, etc. If the accident was due to any defect in structure or machine, state what steps have been taken to correct the defect; if due to lack of guards over rapidly moving parts of machinery, state that fact. . . ."

It is proposed to apply the new rules to all accidents occurring since the beginning of 1915. In addition to bodily injuries heretofore reported, the commission, according to the new rules, would call for reports of cases where the injury disables the man for only two or three days.

At the hearing on Monday the railroads were represented by Messrs. J. Kruttschnitt, W. W. Atterbury and W. G. Besler, a sub-committee of the executive committee of the American Railway Association, and by W. C. Wilson of the Lackawanna, F. V. Whiting of the New York Central, and others. After brief statements on the part of the commission and of the railroads it was decided to defer action until a conference could be held, probably within a month, between the railroad representatives and W. J. Meyer, statistician of the commission. A representative of the federal bureau of labor statistics and one or more from the railway employees' unions will probably take part in the conference. It is expected that Mr. Kruttschnitt's committee will keep the railroads informed of all developments.

principal express companies for September, 1914. (The express companies have three months in which to make reports.)

### The United Engineering Society

The trustees of the United Engineering Society, representing the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, and with the co-operation of the American Society of Civil Engineers at a meeting to be held in the auditorium of the Engineering Societies building, New York, on Wednesday, January 27, at 8:30 p. m., will inaugurate the Engineering Foundation. This foundation, inaugurated by the United Engineering Society, is a fund to be "devoted to the advancement of the engineering arts and sciences in all their branches, to the greatest good of the engineering profession and to the benefit of mankind." The speakers at the meeting will be as follows: Gano Dunn, president of the United Engineering Society and past-president of the American Institute of Electrical Engineers; Dr. Henry S. Pritchett, president of the Foundation for the Advancement of Teaching; Dr. Robert W. Hunt, past-president of the American Institute of Mining Engineers, and Dr. Alexander C. Humphreys, past-president of the American Society of Mechanical Engineers.

### The Railway Club of Pittsburgh

At the regular meeting of the Railway Club of Pittsburgh, to be held at the Monongahela House, Pittsburgh, Pa., on Friday evening, January 22, an illustrated address will be given by H. T. Herr, vice-president and general manager of the Westinghouse Machine Company, dealing with recent developments in

steam engineering, and more especially with turbines for driving electric generators and as used for marine propulsion.

## MEETINGS AND CONVENTIONS

*The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. Hereafter the full list of meetings and conventions will be published only in the first issue of the Railway Age Gazette for each month.*

- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, March 2-3, San Francisco, Cal.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August. Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meetings, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next regular meeting, January 21, 1915, Atlanta, Ga.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month except June, July and August, Waldorf-Astoria, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

## Traffic News

The Grand Trunk and the Canadian Pacific have taken off each one train in each direction between Montreal and Ottawa, on account of the shrinkage of business.

The Michigan railroads have announced their intention of urging a repeal of the state two-cent fare law and the substitution of a law which will permit fares on the basis of 2½ cents a mile.

The railways of Illinois have definitely decided to ask the legislature to make a change in the law so as to allow an increase of passenger fares to the basis of 2½ cents a mile, and have appointed a committee to conduct a campaign, of which S. G. Hatch, passenger traffic manager of the Illinois Central, is chairman.

The commissioner of agriculture of Virginia is this week running an instruction train over the New York, Philadelphia & Norfolk, stopping at Oak Hall, Bloxum, Onley, Nassawadox and Cape Charles.

The Chicago, Burlington & Quincy has announced that during the calendar year 1914 it carried 24,445,911 passengers without a fatality to a passenger for which the railroad could be held legally responsible.

A bill has been introduced in the legislature of North Carolina to repeal the long and short haul clause of the intrastate freight rate act which was passed last year. A number of short railroads complain that the enforcement of the long and short haul provision has deprived them of important competitive traffic formerly enjoyed.

The Illinois Central has given out a statement that during the two years ending January 1, 1915, it carried 26,271,000 passengers without a fatality to a passenger. In its Chicago suburban trains, which carry 40,000 passengers a day the company says it has not killed a passenger for 53 years, or since the beginning of the suburban service, and it is also stated that no revenue passenger has been killed on the Illinois Central proper, exclusive of the Yazoo & Mississippi Valley, since March 6, 1910.

It has been estimated this week that the grain in cars at New York and Jersey City terminals awaiting trans-Atlantic shipment amounts to more than 7,000 carloads; and the Pennsylvania is said to have 3,000 cars awaiting vessels at Baltimore. That road has been obliged to place an embargo on grain for export through Baltimore. The road is holding 1,379 cars of export freight in yards west of Altoona. Ocean freight rates to Europe are said now to be three or four times the normal rate prior to the war. Many shiploads of grain are lying in English ports waiting to be unloaded. The scarcity of ships is attributed to the unusually large quantity of grain being offered for export and also to the detentions due to the strict regulations of the British government in regard to contraband goods.

The receivers of the Pere Marquette have addressed to the Michigan legislature a petition for a repeal of the state two-cent passenger fare law and the substitution of a law allowing rates of 2½ cents a mile. The petition states that during the last fiscal year the average rate per passenger mile on the Pere Marquette was 1.89 cents, while the actual cost of handling passenger traffic was 2.2 cents. The application says that this road asks no favors for itself that are not granted to all roads in the state on an equitable basis. It is claimed that the freight rates on this road are as low as any in the United States. The receivers declare that they have carried economy to the limit. It is reported that a majority of the members of the Michigan legislature are willing to advance the passenger fares of the Pere Marquette, but that they do not wish to advance rates on certain other roads. Senator Kelley has advocated the passage of a law to require that fares for passenger transportation be made different on the different roads, according to their earnings per mile.



## Commission and Court News

### INTERSTATE COMMERCE COMMISSION

The commission has set March 14 as the date for the hearing on the proposed order authorizing the railroads to divide their primary accounts so as to meet the requirements of the different states. Briefs are to be filed before February 27.

It is announced that hearings will be held by Examiner Attorney Brown on the proposed charges for trap car service, which have been filed by the railroads and have been suspended by the commission, as follows: Detroit, March 1; Cleveland, March 3; Buffalo, March 5; Philadelphia, March 8; Pittsburgh, March 11; Cincinnati, March 15; St. Louis, March 18; Kansas City, March 22, and Chicago, March 25.

#### Class and Commodity Rates to and from Quincy, Ill.

*Opinion by Commissioner Clements:*

The carriers having proposed to increase class and commodity rates between Quincy, Ill., Hannibal and Louisiana, Mo., and points taking the same rates, on the one hand and points in trunk line and central freight association on the other, the commission finds that such increase is not justified. In the Mississippi River case (28 I. C. C., 47) the commission held that there was no reason why all the crossings from St. Louis to Dubuque should not be on the same basis with respect to traffic from seaboard territory. For reasons stated in the opinion in that case the rates to the upper crossings were not reduced to the St. Louis basis. To increase rates now to Quincy, Hannibal and Louisiana, to the upper crossing basis, leaving St. Louis the only crossing taking lower rates, would not benefit the upper crossings and would have a serious effect on the business interests of the three cities involved and would redound only to the benefit of St. Louis. (32 I. C. C., 471.)

#### Rates on Cement from Points in Illinois

*Opinion by Commissioner Harlan:*

The commission finds that the carriers have justified an increase from eight cents to 10 cents per 100 lb. in the rate on cement in carloads from Chicago group points to St. Paul. A similar increase of 8.5 cents to 10.5 in the rates from St. Louis to St. Paul is likewise found justifiable. An increase in the rate on cement from Mason City, Ia., to St. Paul from 5 cents to 7 cents is held to result in an unreasonable rate, but the commission allows an advance to 6 cents. In the case of the rate from Des Moines to St. Paul the commission refuses to allow an advance from 7 cents to 9 cents, but will permit the carriers to make an advance to 8 cents. A proposed increase from 15 cents to 17 cents in the rate from Iola, Kan., to St. Paul is not justified. (32 I. C. C., 369.)

#### Transcontinental Commodity Rates to San Jose, Santa Clara and Marysville, Cal.

*Opinion by Commissioner McChord:*

The commission in *Santa Rosa Traffic Association v. Southern Pacific* (24 I. C. C., 46, and 29 I. C. C., 65) found, with respect to the physical condition surrounding the delivery of transcontinental freight, that there was no dissimilarity sufficient to justify the defendants in giving "terminal" commodity rates to San Jose, Santa Clara and Marysville and at the same time denying such rates to Santa Rosa. The defendants were therefore required, so long as they applied "terminal" commodity rates to San Jose, Santa Clara and Marysville, to apply no higher rates to Santa Rosa, it not being stated, however, whether similar rates should be granted to Santa Rosa or withdrawn from the other three points. The carriers elected to withdraw the terminal privileges granted the other three points. The commission now finds that the carriers have not justified this proposed change, it being held that the withdrawal of terminal commodity rates to San Jose, Santa Clara and Marysville which are not directly reached by Atlantic-Pacific ocean lines while continuing such rates to other interior California points not directly reached

by said ocean lines would subject these three points to discrimination. The commission in its decision states that there can be no question about the great commercial advantages which accrue to the towns having these terminal rates and that in the contest for the new factories and industries looking for locations on the Pacific coast the town with these rates has an advantage which cannot be overcome by its rivals without them. "In one sense, the competition between towns for new factories and industries is more important than the competition between factories and industries already in those towns for trade. New factories mean more workers, more money, more houses and more people in general, and, after all, the struggle between these Pacific coast cities is essentially one for population." The rule is laid down that when the question of freight rates enters into the competition of cities and towns in any respect whatsoever, whether that competition is one for trade, factories, or people, complaints alleging unjust discrimination will be entertained by the commission. (32 I. C. C., 449.)

#### Rates on Lumber from Anoka, Minn.

*In re rates on lumber from Anoka, Minn., and other points to stations in South and North Dakota. Opinion by Commissioner McChord:*

The commission finds that the Chicago, Milwaukee & St. Paul has not justified proposed increased rates on lumber in carloads from Anoka and other points in Minnesota to points in South Dakota and North Dakota. "The justification offered for the proposed increased rates is hardly more than an expressed desire to secure uniformity in the rate relationship. There are doubtless cases where increased rates may be proper for this purpose, but it is to be remembered that uniformity may be secured in many cases by reduced rates as well as by increased rates. The mere fact that a relation of rates requires readjustment in the interest of uniformity is not proof that rates increased to the level of the relatively higher rates are reasonable." (32 I. C. C., 494.)

### STATE COMMISSIONS

New Mexico.—See Court News.

The New Jersey Public Utility Commission has issued an order looking to the abolition of 15 highway grade crossings in Paterson.

The Railway Commission of Canada has notified the railways that changes in schedule time of passenger trains must be announced at stations ten days in advance.

The Southern Pacific, the Atchison, Topeka & Santa Fe and the Western Pacific have notified the California Railroad Commission that they will abolish all switching charges on cars delivered from or taken to industry tracks, when incidental to a line haul.

J. M. Atkinson, chairman of the Missouri Public Service Commission, has issued a statement saying that if the Missouri legislature seeks to pass a bill increasing the state passenger fare from 2 cents to 2½ cents a mile the state commission will put no obstruction in the way.

The Colorado Public Utilities Commission has summoned six railroads to appear on February 16, to show cause why the intrastate rates on coal should not be reduced. The same roads also have been ordered to appear on February 8, to show cause why certain of their passenger fares between mountain points should not be reduced.

The Railroad Commission of Louisiana has authorized the Tremont & Gulf to take up the track of its Pyburn branch, extending from Menefee, La., to Pyburn, 11 miles. The commission has examined the track and says that it is in such bad condition as to be unsafe for the operation of trains. It is estimated that the rails are worth \$26,000.

Although the Minnesota Railroad & Warehouse Commission issued an order limiting the speed of passenger trains on the main track of the Chicago, Rock Island & Pacific in Minnesota to 30 miles an hour on the recommendation of an inspector of the commission, as stated in our issue of January 15, an inspection of the track by the commission itself showed that this order was unnecessary and it was annulled immediately after this in-

spection. The commission found the track to be safe for the speed at which trains were being run over it.

### PERSONNEL OF COMMISSIONS

John H. Roemer has resigned as a member of the Wisconsin Railroad Commission, effective February 1.

Nathaniel S. Ketchum, a member of the Board of Railroad Commissioners of Iowa, died at his home in Marshalltown, Iowa, on January 17, aged 75 years.

Carl D. Jackson, of Oshkosh, Wis., former district attorney of Winnebago county, has been appointed a member of the Wisconsin Railroad Commission, to succeed John H. Roemer, resigned.

### COURT NEWS

The Supreme Court of Virginia in a case involving the transportation by express of liquors from Virginia into North Carolina holds that the carrier cannot refuse to transport when the goods are intended for personal consumption and not for sale.

The Texas Cattle Raisers' Association has filed suit in the Federal Court at Kansas City, Mo., against 10 railroads, to recover alleged excess freight rates paid by shippers on cattle shipments from 1903 until the rates were reduced by the Interstate Commerce Commission in 1908.

The Wisconsin Supreme Court last week rendered a decision holding unconstitutional the local taxation of property of the Minneapolis, St. Paul & Sault Ste. Marie, consisting of ore docks and freight terminals in Douglas county, on the ground that this property cannot be separated from the other property of the railroad in the state and be subjected to local taxation at a higher rate than the rate applied by the state tax commission. The court said that terminal facilities constitute property necessarily used in the operation of a railroad and hence become part of the entirety.

The Supreme Court of the United States has affirmed the judgment of the Supreme Court of Georgia, sustaining the railroad commission of that state in imposing a fine of \$1,000 on the Wadley Southern for discrimination in the distribution of shipments of freight which were to go beyond its own line. Certain shippers had complained that the Central of Georgia was favored, as against the Macon & Dublin. The statute authorizing the commission to punish disobedience of its orders by a fine, allows cumulative fines in such a large sum that the defence argued that this law, in effect, denied the railroad due process of law, as carriers would obey an unreasonable order rather than take the risk of an excessive penalty. The federal court held, however, that the law was not unconstitutional, as another statute of Georgia provides for a hearing before the imposition of a fine.

Judge Putnam, in the United States Circuit Court of Appeals, at Boston, last week, decided in favor of the Boston & Albany Railroad in its suit to be exempted from the provisions of the Federal corporation tax law. The court holds that the road's property being leased to the New York Central, it does not come within the terms of the law imposing a corporation tax for "doing business." The road receives an annual income of \$2,000,000 from the New York Central; but the receipt of this money and the payment of dividends are not to be understood as "doing business" within the meaning of the statute.

The Supreme Court of New Mexico, in a decision by Chief Justice Roberts, has sustained the corporation commission of that state in dismissing a complaint of the New Mexico Woolgrowers' Association, asking that the Atchison, Topeka & Santa Fe be required to maintain scales, on which to weigh livestock, at five principal points on the line of its road in that state. The commission held that as livestock is carried by the carload, and not by actual weight, the weighing of the animals is not a feature of transportation and therefore the railroad is not called upon to maintain scales for that purpose. At all of the places which figured in the complaint scales are available on which animals can be weighed for a small fee. It appears that the shippers desire free scales, not in connection with transportation, but to enable them to ascertain actual weights for use in making out the bills to be paid by the buyer.

## Railway Officers

### Executive, Financial, Legal and Accounting

E. L. Parker has been appointed treasurer and paymaster of the Texarkana & Ft. Smith, with headquarters at Texarkana, Ark., succeeding I. C. McGee, resigned.

I. C. McGee, treasurer of the Texarkana & Ft. Smith, has been appointed treasurer of the Kansas City Southern, with headquarters at Kansas City, Mo., succeeding H. Visscher.

C. J. Kulp, assistant treasurer of the Lehigh Valley, with headquarters at Philadelphia, Pa., has been elected treasurer. J. M. Baxter, who retires as treasurer, has been in poor health for the

past two years and requested that he be not re-elected. Mr. Kulp was born in Philadelphia, Pa., and has lived there all his life. He has been connected with the Lehigh Valley for 28 years, having entered the accounting department as a clerk in the disbursing office under Isaac McQuilkin, who was auditor of the railroad at that time. In 1903, when the treasury department of the Lehigh Valley was reorganized, Mr. Kulp assisted in that work and was selected as teller for the reorganized department, in which position he remained for four years, when he became chief

clerk of the department. In 1910 he was elected an assistant treasurer, with office at Philadelphia, Pa., which position he held at the time of his recent election as treasurer of the same road, as above noted.

### Operating

Frank Hanning Wilson, whose appointment as general superintendent of the New York Central, in charge of the lines between Toledo and Chicago, with headquarters at Chicago, has

already been announced in these columns, was born at Indianapolis, Ind., on November 12, 1873. He was educated in the public schools at Indianapolis and began railway work when 14 years of age as a messenger for the Indiana, Bloomington & Western. Subsequently until 1894 he was clerk to the trainmaster and to the superintendent of that road and the Cincinnati, Indianapolis, St. Louis & Chicago, and then until December, 1902, was secretary and chief clerk to the general superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, successor to the Cincinnati, Indianapolis,



F. H. Wilson

St. Louis & Chicago, and trainmaster of the Peoria & Eastern division. Mr. Wilson became connected with the Lake Shore



& Michigan Southern in January, 1903, as special representative to the general manager. In February of the following year he was appointed trainmaster at Toledo, Ohio; in February, 1905, he was advanced to assistant division superintendent at Chicago, and in November of that year he was promoted to superintendent of the Western division, with headquarters at Chicago. He was made assistant general superintendent at Cleveland in January, 1910, and is now promoted to general superintendent of the New York Central and the Lake Shore & Michigan Southern, as has been previously stated in these columns, having become a part of the consolidated New York Central Railroad.

J. F. Tracy, trainmaster of the Northern Pacific at White Bear, Minn., has resigned, and the position is abolished.

W. E. Welch, assistant superintendent of the Fort Smith & Western and the St. Louis, El Reno & Western, has been appointed superintendent of those roads, with office at Fort Smith, Ark.

J. H. Curry, assistant trainmaster of the Lehigh Valley, at Delano, Pa., has been promoted to trainmaster of the Seneca division, with headquarters at Sayre, Pa., succeeding John Pickley, who has been transferred to the Board of Examiners of Engineers and Firemen, and T. J. Burke, division engineer at Hazleton, Pa., has been appointed assistant trainmaster of the Mahanoy & Hazleton division, with headquarters at Delano, succeeding Mr. Curry.

J. F. Porterfield, whose appointment as general superintendent of transportation of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago, has already

been announced in our columns, was born at Pulaski, Ill., on February 23, 1871. He was educated in the public schools and began railway work in May, 1883, with the Illinois Central, with which road he has remained ever since. He was successively messenger boy, telegraph operator, and agent, until 1890, and the following seven years was chief clerk on various divisions. From 1897 to 1905 he was trainmaster on different divisions, and from that date until May, 1912, was division superintendent at Vicksburg, McComb, Miss., at Memphis, Tenn., and at Carbondale, Ill. Mr. Porter-



J. F. Porterfield

field was then appointed general superintendent of the lines south of the Ohio river, with headquarters at New Orleans, La., from which position he is now promoted to that of general superintendent of transportation, as above noted.

#### Engineering and Rolling Stock

James F. Donovan, supervisor of the Lehigh Valley at Delano, Pa., has been appointed division engineer, with headquarters at Hazleton, succeeding T. J. Burke, transferred to the operating department.

B. F. Beckman, superintendent of the Fort Smith & Western and the St. Louis, El Reno & Western, has been appointed engineer of those roads, with headquarters at Fort Smith, Ark.

J. K. Brassill, general master mechanic of the Northwestern Pacific at Tiburon, Cal., has been appointed superintendent of motive power and marine equipment of the Northwestern Pacific lines, with headquarters at Tiburon.

E. T. Reisler, division engineer of the Lehigh Valley at Buffalo, N. Y., has been transferred in the same capacity to Auburn, and L. P. Rossiter, assistant engineer of the Chicago, Rock Island & Pacific, at Manly, Iowa, has been appointed division engineer of the Lehigh Valley, with office at Buffalo, N. Y., succeeding Mr. Reisler.

#### Traffic

R. C. Campbell, agent of the Georgia Railroad at Athens, Ga., has been appointed general agent, with headquarters at the same place.

C. M. Swan has been appointed assistant general freight and passenger agent of the Mississippi River & Bonne Terre, with office at Bonne Terre, Mo.

W. S. Mitchell, commercial agent of the Missouri Pacific, the St. Louis, Iron Mountain & Southern, the Denver & Rio Grande and the Western Pacific, at Portland, Ore., has been appointed general agent at Seattle, Wash., succeeding J. M. Norton, deceased. E. B. Duffy succeeds Mr. Mitchell.

Michael J. Powers, whose appointment as general passenger agent of the Delaware & Hudson, with headquarters at Albany, N. Y., has already been announced in these columns, was born

on June 9, 1882, at Albany, N. Y., and graduated from the Albany Business College in 1899. The following year he entered the service of the Delaware & Hudson as a clerk in the office of the auditor of revenue. Six months later he became a stenographer to the chief clerk in the office of the general passenger agent. In 1905 he became stenographer to the assistant general passenger agent, and was also given charge of the ticket room and the advertising department. Mr. Powers was promoted in January, 1910, to chief clerk, which position he held at the time of his

recent appointment as general passenger agent of the same road, with headquarters at Albany, N. Y., as above noted. Mr. Powers' entire service has been with the Delaware & Hudson.



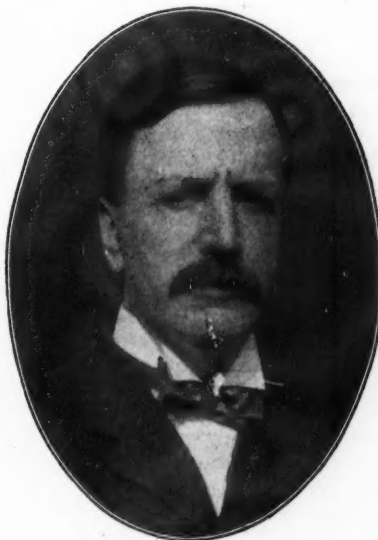
M. J. Powers

#### OBITUARY

John B. Laurie, purchasing agent and general storekeeper of the Central Vermont, with headquarters at St. Albans, Vt., died

on January 16, at his home in that city after an illness of many months. Mr. Laurie was born on February 22, 1862, at Sarnia, Ont., and began railway work with the Grand Trunk. He served as storekeeper on the Grand Trunk at London, Ontario, until September, 1899, when he left that road to enter the service of the Central Vermont and since that time until he was compelled on account of poor health to give up active work had been purchasing agent and general storekeeper of the Central Vermont, with headquarters at St. Albans, Vt. Mr. Laurie is survived by one sister, who is a resident of St. Albans.

John M. Brewer, freight claim agent of the Southern Pacific at San Francisco, Cal., died in that city on January 18.



J. B. Laurie

## Equipment and Supplies

### LOCOMOTIVE BUILDING

THE SERVIAN GOVERNMENT is reported to have ordered 7 small locomotives from the American Locomotive Company.

THE ILLINOIS CENTRAL, as has been noted in these columns, has ordered 25 Mikado type locomotives from the Lima Locomotive Corporation. These locomotives will have 27 by 30 in. cylinders, 63 in. driving wheels, a total weight on drivers of 217,000 lb., a total weight of 280,000 lb., and a tractive effort of 51,700 lb. The diameter of the boilers will be 82 in. at the smallest ring. The boiler will be built to carry a working pressure of 200 lb., but will be operated at a pressure of 175 lb.

### CAR BUILDING

THE ILLINOIS CENTRAL is in the market for 5 gondola cars.

THE INTERBOROUGH RAPID TRANSIT is in the market for 478 steel car bodies.

THE UNION PACIFIC is asking bids on 750 40-ton capacity steel underframe stock cars.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE is in the market for 3 postal cars.

THE GRAND TRUNK is reported to be planning to build a number of freight cars in its shops at Chicago.

THE DELAWARE, LACKAWANNA & WESTERN is in the market for 5 combination passenger train cars with mail compartments.

STANG, CHALFANT & Co., Pittsburgh, Pa., are asking prices on ten 150,000 lb. capacity flat cars and six 80,000 to 100,000 lb. capacity hopper cars.

SWIFT & COMPANY are reported to have ordered 250 freight cars from the Haskell & Barker Car Company. This item has not been confirmed.

### IRON AND STEEL

THE NEW YORK CENTRAL has ordered 20,000 tons of steel rails, the total being divided among the Steel Corporation, the Bethlehem Steel Company and the Lackawanna Steel Company.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 20,000 tons of steel rails, the total being divided among the Maryland Steel Company, the Lackawanna Steel Company and the Bethlehem Steel Company.

THE SOUTH MANCHURIAN RAILWAY RETRENCHES.—The South Manchuria Railway because of the present war has so retrenched as far as new construction is concerned that contractors are all suffering from depressed business. Several of them are reported to be planning to go to Korea.

A BILL TO FURTHER RAILWAY CONSTRUCTION IN ARGENTINA.—A bill recently presented by the public works committee of the Argentine senate proposes to authorize railways to undertake or continue under the most economical conditions possible, with due regard to security of traffic, branch lines already approved or to be approved. The project would permit postponement of construction of stations and other permanent equipment and employment of used or lighter materials than those prescribed for main lines. Facilities for operating such lines would also be granted, such as stopping between stations, observance of only such measures of safety as are necessary to meet local requirements, and extension of delays for carrying passengers and merchandise. The project would also suspend periods stipulated for surveys and construction of lines already authorized until such time as the executive power considers the financial situation normal. The difficulty of securing capital has made railway extension impracticable in most instances, and in a number of cases additional delays have already been granted by the government for the construction of lines.

## Supply Trade News

W. H. Arkenburgh, for a long time publicity manager of the Union Switch & Signal Company, has joined the sales department of the National Carbon Company, Cleveland, O., and will have charge of railway and signal work in Canadian territory.

R. M. Nicholson, former advertising manager for the Kimberly-Clark Paper Company, Neenah, Wis., and also former space buyer for the Cramer-Krasselt Company, Milwaukee, has been placed in charge of the advertising of the Stark Rolling Mill Company, Canton, Ohio.

A fire on the night of January 18 totally destroyed the insulated wire department of the John A. Roebling's Sons Company, Trenton, N. J., at an estimated loss of \$1,000,000. No part of the wire mills or wire rope works was damaged, and the work performed by the plant destroyed will be taken care of in other shops.

H. H. Seabrook, formerly district manager of the Westinghouse Electric & Manufacturing Company in Baltimore, has been appointed district manager of the company at Philadelphia, succeeding J. J. Gibson, who has become manager of the tool and supply department at East Pittsburgh. Owing to a consolidation of territories the Philadelphia offices will hereafter embrace that previously covered by the Philadelphia and Baltimore offices.

Announcement is made that on January 1 the John Seaton Foundry Company and the Locomotive Finished Material Company, Atchison, Kan., were consolidated, and that they will hereafter continue the business of both companies under the name of the Locomotive Finished Material Company. The directors of the consolidated companies are as follows: John C. Seaton, H. E. Muchnic, Clive Hastings, W. S. Ferguson and G. L. Seaton.

### TRADE PUBLICATIONS

CORK INSULATION.—"At War with Heat" is the title of a little booklet issued by the Armstrong Cork & Insulation Company, Pittsburgh, Pa., describing the company's Nonpareil Corkboard Insulation for refrigerator plants and similar facilities.

RAILWAY BUILDINGS.—The National Fire Proofing Company, Chicago, recently published a 24-page booklet describing the use of the Natco hollow tile in railway structures. Numerous buildings are illustrated in which this fireproof material is used.

LUMBER.—The Gum Lumber Manufacturers' Association, Memphis, Tenn., has issued a 16-page booklet discussing the use of Red Gum lumber as a cabinet wood. It describes the structure of the wood and illustrates the uses for which it is adapted.

FUEL OIL BURNERS AND EQUIPMENT.—The Production Engineering Company, Philadelphia, Pa., has recently issued pamphlet O, entitled "Facts About Fuel Oil," which treats of the company's Peco Oil Burner, and names its advantages for various kinds of service.

HEAT TREATING FURNACES.—The Quigley Furnace & Foundry Company, Springfield, Mass., has recently issued bulletin No. 7, an illustrated folder illustrating and describing the company's underfired accurate temperature heat-treating furnaces using gas or oil fuel.

SCREW CUTTING TOOLS & MACHINERY.—The Wiley & Russell Manufacturing Company Division, Greenfield Tap & Die Corporation, Greenfield, Mass., has issued catalog 36, containing illustrations, sizes and price-lists of the company's "Lightning" and "Green River" screw cutting tools and machinery.

VALVE GEARS.—A booklet recently received from the Southern Locomotive Valve Gear Company, Knoxville, Tenn., contains some interesting data regarding the Southern valve gear. A number of indicator cards are included, taken from locomotives fitted with this type of gear as well as data taken from the results of tests of locomotives to which this gear has been applied. Illustrations of the gear itself as well as locomotives fitted with it are included.



## Railway Construction

**CANADIAN NORTHERN.**—The Railway Commission of Canada has authorized this company to open for traffic, its line from a junction with the Battle River subdivision north of Camrose, Alta., to a junction with the Canadian Northern Western near Strathcona (South Edmonton) a distance of 46 miles.

**ELECTRIC SHORT LINE.**—The laying of steel and ballasting on the 22 miles of new road of this company is nearly completed, and it is expected to be ready for service by February 10, 1915. This stretch will complete the line from Minneapolis, through Stubbs Bay, Lyndale and Watertown to Winsted. The first 18 miles from Minneapolis to Stubbs Bay have been under operation since May, 1914.

**HORSE CREEK LAND & MINING COMPANY'S ROAD.**—An officer writes that a contract has been given to Board & Duffield, Charleston, W. Va., for building the first section of three miles from Woodville, W. Va., on Horse creek up Peter Cave Fork. About 10 per cent of the work will be rock work, and there will be about 10,000 cu. yd. of cut and fill to the mile. The maximum grade will be 4 per cent and the maximum curvature 12 deg. The line is being built to carry coal, and when completed will be operated by the Chesapeake & Ohio. W. L. Ashby, president; L. E. Poteel, general manager, and Romaine & Snyder, chief engineers, Charleston, W. Va.

**HOUSTON & TEXAS CENTRAL.**—A strip of land was recently purchased by this company at Hempstead, Tex., to provide room for removing of some unnecessary curvature in yard tracks at that point.

**KANSAS CITY, MEXICO & ORIENT.**—The cities of Cristobal, Tex., and Sonora have agreed to give bonuses amounting to \$315,000 to the Kansas City, Mexico & Orient upon the completion of the branch line from San Angelo, Tex., through Sonora to Cristobal. It is said that this line will eventually be extended to Del Rio, 175 miles from San Angelo.

**PENNSYLVANIA LINES WEST.**—Improvements are to be carried out at Midland, Pa., to double the capacity of the yards at that place. The work at Midland will include the building of an entirely new yard, and laying additional tracks leading to the yard, a new freight terminal, two overgrade crossings, culverts, water stations and passing sidings.

**PENNSYLVANIA ROADS (Electric).**—According to press reports from Chambersburg, Pa., a company will ask for a charter in Pennsylvania to build a line from McConnellsburg, Pa., east to Fort Loudon, about eight miles. It is understood that preliminary surveys for the line will be started soon. E. J. Post, H. A. Duffey and D. H. Patterson are said to be interested.

According to press reports New York capitalists have secured an old right of way between Youngsville, Pa., and Sugargrove, 9 miles, and will build an electric line between these two places. Surveys are now being made and it is expected that construction work will be started in the spring.

**SOUTHERN RAILWAY.**—We are told that bids for grading work were asked for recently, and that this company will at once revise and double track the 28.7 miles of its Washington-Atlanta line between Orange, Va., and Charlottesville. The work will be heavy and will cost \$1,500,000. The revision work between Orange and Charlottesville will eliminate 1,303 deg. of curvature, and will give a maximum grade northbound of 0.9 per cent and southbound of 1 per cent as against 1.41 per cent in both directions at present. On the completion of this work, together with other work now under way, the Southern will have a total of 338.7 miles of double track between Washington and Charlotte, leaving only 41.3 miles of single track between these places.

**UNITY RAILWAY.**—Under this name a company has recently been incorporated at Harrisburg, Pa., with a capital of \$190,000 to operate a steam railway in Allegheny and Westmoreland counties, Pennsylvania. The incorporators are all residents of Pittsburgh, and Boyer, Jones & Morton, Pittsburgh, are attorneys for the company.

**VIRGINIA-BLUE RIDGE.**—This company, which projected a line last year from Tye river, Va., which is on the Southern Railway, north via Lowesville to Massies Mill, about 22 miles, has started construction work, it is said, with its own forces. J. W. Dwight, president, Ithaca, N. Y.; A. K. Murrell, chief engineer, Tye river, Va. (June 19, p. 1565.)

**WISCONSIN & NORTHERN.**—A proposed new line, extending from Van Ostrand, Wis., north through Lily to Crandon, is being built by this company. The new road will be 30 miles long and will connect existing portions of the main line. Grading will amount to about 16,000 cu. yd. a mile. Six miles have been graded. The maximum gradient will be 0.8 per cent and the maximum curvature 5 deg. One bridge with a span of 70 ft. and about 1,100 lineal feet of pile bridging will be required. Peter Nelson & Co., Minneapolis, Minn., have been awarded the contract for grading. C. H. Hartley, Oshkosh, Wis., is general manager.

## RAILWAY STRUCTURES

**CHICAGO, ILL.**—Following a meeting of the directors of the Union Station Company, last week, a statement was given out that suggestions were made at the meeting as to procuring funds, which make it probable that sufficient money can be obtained to make an early start on the work on the Pennsylvania Company's freight terminal, and that it is proposed to start work as soon as possible on the passenger terminal. Plans for beginning work on the Pennsylvania freight terminal have been delayed by negotiations for some property owned by the Baltimore & Ohio Chicago Terminal, which is involved in an ordinance pending before the council committee.

**FALSE CREEK, VANCOUVER, B. C.**—In accordance with a contract with the city of False Creek, the Great Northern will construct terminal facilities at that point. Plans, however, have not yet been formulated.

**HARRISBURG, PA.**—We are told that the Cumberland Valley will start work soon on a new arch bridge over the Susquehanna river at Harrisburg, to replace the present steel deck truss bridge which is a single track structure of 25 spans on stone piers. The new bridge is to carry two tracks; it will have 46 spans and will be 4,000 ft. long. The present piers will be utilized and a number of additional ones built. The work will cost about \$750,000. The railroad's forces have already completed the foundations from bed rock to an elevation of about one foot above the normal elevation of the water, and the rest of the work will be placed under contract within a short time. In connection with this improvement the railway will build undergrade crossings at Front and Second streets in Harrisburg. The grades of these streets have been depressed and concrete abutments constructed to support solid floor steel bridges, which will be covered with concrete. This work will eliminate all the grade crossings of the Cumberland Valley in Harrisburg.

**JACKSONVILLE, FLA.**—We are told that a contract has been given to Hillyer & Sperring, Jacksonville, for building a viaduct which is to carry Duval street over Hogans creek and the tracks of the St. Johns River Terminal Company and the Seaboard Air Line. The viaduct is being built jointly for the St. Johns River Terminal Company and the Seaboard Air Line. It is to be of reinforced concrete construction on pile foundation and is to have a 30-ft. roadway with two 6 ft. sidewalks. There will be 31 spans, varying in length from 18 ft. to 41 ft. each; the length of the viaduct, not including approaches, will be 800 ft., and the fill and approaches 1,335 ft.

**SPARTANBURG, S. C.**—In connection with its modern export coal terminal, now under construction at Charleston, the Southern Railway announces that on February 1 it will begin work on important additions to its Spartanburg yards and will also extend a number of passing tracks between Spartanburg and Charleston. It is expected that the terminal will be completed by May 1 and the additional track facilities will also be ready by that time. Two additional receiving tracks will be constructed at the Spartanburg Junction classification yard and two at East Spartanburg. Passing tracks will be extended at Carlisle, Alston and Herbert on the Spartanburg division, and at Riley and Fort Motte on the Charleston division.

## Railway Financial News

**BALTIMORE & OHIO.**—A semi-annual dividend of 2½ per cent has been declared, payable March 1. This reduces the annual rate from 6 per cent to 5 per cent. In making this announcement President Willard commented on the directors' decision as follows:

"When in July last consideration was given to the question of dividend then to be declared we had been hopeful that the railroads in the eastern territory might at an early date be permitted to generally increase their freight rates full 5 per cent as requested, in which event with normal conditions as to business, the Baltimore & Ohio in my opinion should and could with its present facilities, pay 6 per cent on its common stock with a reasonable surplus over.

"Just what the ultimate effect of the recent decision may be cannot now be stated, but it is estimated that with the direct increases allowed, which will largely become effective by February 1, the Baltimore & Ohio should realize an increased net income, based on business of 1914, of from \$2,225,000 to \$2,500,000 a year, or a sum equal to about 1½ per cent on the common stock.

"Having in mind the effect of these increases on the future revenue of the company, even should the volume of business continue for a time to be only on the basis of the past six months, it is felt that the results in the future, with a proper consideration of the interests of the company's more than 35,000 shareholders, will justify the action taken at this time in declaring a 2½ per cent dividend, although the earnings for the first six months fell somewhat short of the amount necessary for this purpose."

See also President Willard's comments on the general situation printed elsewhere in this issue.

**CHICAGO, MILWAUKEE & ST. PAUL.**—Kuhn, Loeb & Company and the National City Bank, both of New York, have underwritten the offer of \$29,141,300 5 per cent convertible bonds of the Chicago, Milwaukee & St. Paul which was made to stockholders at par.

**CHICAGO, ROCK ISLAND & PACIFIC.**—Former Judge Walter C. Noyes has been appointed receiver of the Chicago, Rock Island & Pacific Railroad, the Iowa holding company, maker of the collateral trust mortgage bonds under which the Railway company stock was deposited. This is one of the final steps in the winding up of the affairs of the holding companies.

The bondholders' committee has sent a notice to depositing bondholders reading in part as follows:

In order to carry out the purchase of 713,535 shares of Chicago, Rock Island & Pacific Railway stock, the committee has borrowed the entire amount of the cash requirements under the plan, for which the committee has pledged the stock required, as well as all deposited bonds and coupons.

Bonds in excess of \$61,354,000 have been deposited with the committee under the plan so that if no additional bonds are deposited with the committee and if none of the undeposited bonds avail themselves of the right of exchange given by the court order, the amount of excess stock cannot in any event reach \$10,000,000. The entire amount of stock available for distribution under the plan is distributable among depositors against payment of their pro rata share of the cash requirements of the plan.

The committee deems it of the utmost importance to depositors that, so far as practicable, distribution of stock should be made as soon as possible so that depositors may exercise the rights of stockholders at the annual meeting, which now stands adjourned to March 15, 1915, and in the meantime be in a position to take such action looking toward their mutual protection as they may deem wise. The committee, therefore, proposes at once and Central Trust Company is now ready to make distribution of stock equal at par to the face amount of the deposited bonds against payment by depositors of their pro rata of the costs of foreclosure and the expenses of the committee (\$4.45 per bond), leaving the excess stock to be

distributed as soon after March 15, 1915, as possible. The excess stock available for distribution to depositing bondholders will be distributable at the price of \$10.42 per share (which includes interest and cost of federal and state transfer stamps). The amount realized from such distribution, together with the payment by depositing bondholders of \$4.45 per bond and the amounts to be received from non-depositing bondholders under the court order of December 21, 1914, will, in the aggregate, suffice to meet the cash requirements of the plan.

**MISSOURI, KANSAS & TEXAS.**—One of the provisions of the agreed judgment by which the affairs of the Missouri, Kansas & Texas, of Texas, was adjusted with the state of Texas was that joint auditors should be appointed to investigate the charge that the Texas company had been unfairly treated by the Kansas company.

This report has just been filed in the district court. O. H. Bowers, auditor of the company, was selected to represent the railroad, and W. S. McFarland, a chartered accountant of Nashville, Tenn., was appointed by Attorney-General B. F. Looney to represent the state of Texas. These two auditors are unanimous in their findings that the Missouri, Kansas & Texas of Texas has never at any time been made to bear an undue or illegitimate burden for the benefit of its parent company; on the contrary, the Texas property has been favored in several important respects, particularly in the matter of using the cars of the Missouri, Kansas & Texas of Kansas, the latter making no rental charge for such equipment. As to division of earnings, the report says they were found to have been fair and in accordance with the best practices. The joint expenses of the two properties are prorated on the basis of gross earnings, which the report says is fair. The Missouri, Kansas & Texas of Kansas furnishes its Texas subsidiary supplies at actual cost. The joint auditors say that the Missouri, Kansas & Texas of Texas owes the Missouri, Kansas & Texas of Kansas \$23,000,000 on open account. This is a just claim, the report says.

**MISSOURI PACIFIC.**—The Wall Street Journal published an article last week stating on what was said to be the best authority that the Gould family and Gould estate had practically sold all of their stockholdings of Missouri Pacific, various members of the family retaining only sufficient stock to qualify as directors.

A committee has been formed which is asking for proxies for the annual meeting. The committee consists of Alexander J. Hemphill, chairman of the board, Guaranty Trust Company, New York; Otto H. Kuhn, of Kuhn, Loeb & Company; Seward Prosser, president, Bankers' Trust Company; James N. Wallace, president, Central Trust Company, all of New York, and Robert Winsor, of Kidder, Peabody & Company, Boston.

**NEW YORK, NEW HAVEN & HARTFORD.**—The Connecticut superior court has overruled demurrers filed by the defendants in the suit by the New York, New Haven & Hartford against John L. Billard and others to recover \$3,825,147 claimed to be the profit in the transfer of the Boston & Maine stock to and from the Billard Company.

**PENNSYLVANIA RAILROAD.**—The company has published notices that it is prepared to dispose of its surplus real estate holdings. The surplus real estate holdings in New York alone are estimated to be worth in the neighborhood of \$10,000,000, and the company has large quantities of valuable real estate in other cities.

**WEST JERSEY & SEASHORE.**—A special meeting of stockholders has been called for February 4 to authorize the issue of \$3,000,000 additional stock and the creation of a mortgage to secure \$13,000,000 bonds. Sufficient bonds under the new mortgage to retire \$6,373,000 first consolidated mortgage bonds now outstanding will be reserved.

**TRAVEL TO SWITZERLAND AND ITALY.**—Daily railway service is now in operation between Paris and Switzerland and Italy, by way of Basle. First, second and third-class through cars run between Paris and Basle, dining cars from Bologna to Florence and vice versa, and from Milan to Venice and Bologna to Milan, and sleeping cars from Rome to Florence and Brindisi to Milan.